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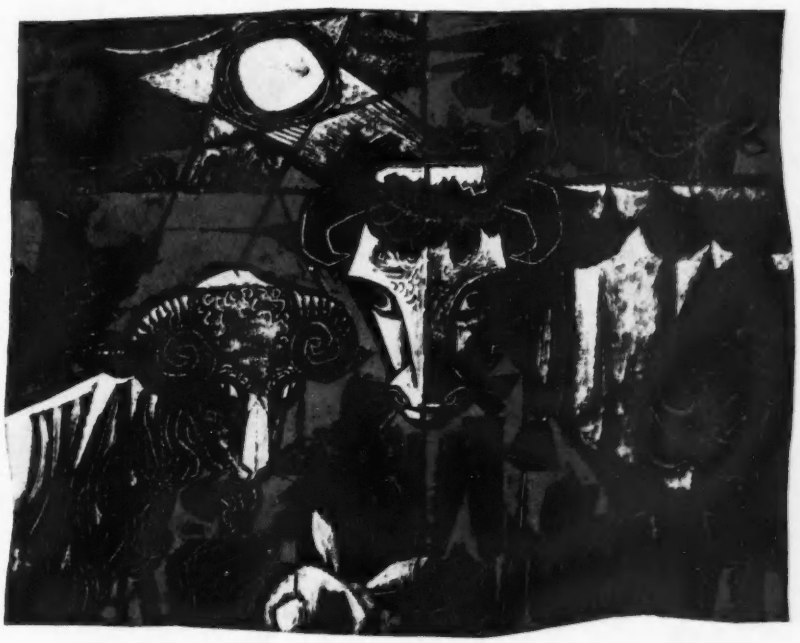
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VOL. 82 No. 2108

5 December 1959

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

NATURE'S CATALYSTS (3)



Green grow the Carbohydrates

Without chlorophyll, life as we know it could not exist. It is the chief pigment in all green vegetable matter, and plays a vital catalytic role in photosynthesis, the process in which water and carbon dioxide combine in the presence of sunlight to form carbohydrates. Animals need carbohydrates but cannot synthesize them, and so depend ultimately on plants and their chlorophyll to provide these food materials.

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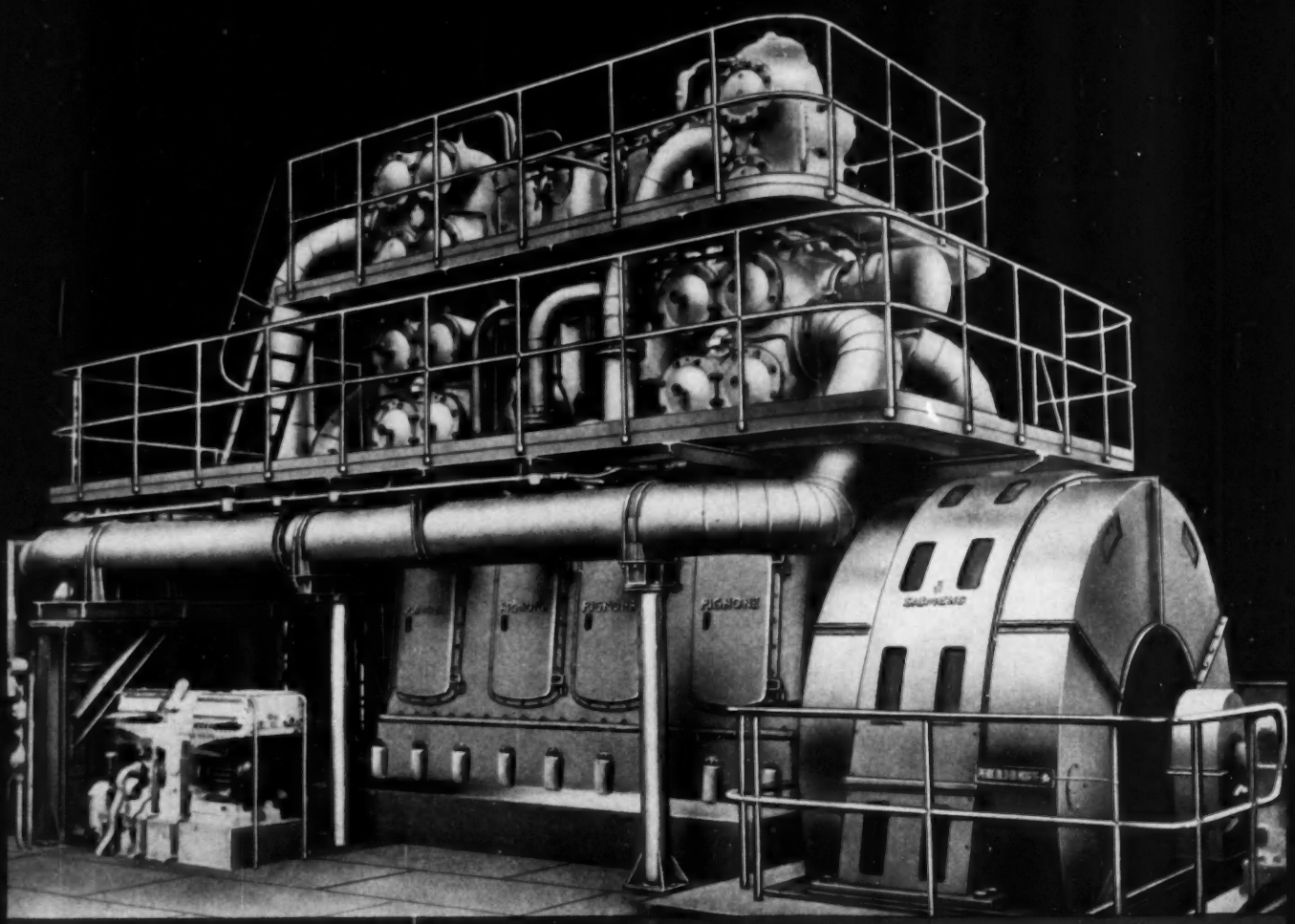
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8272

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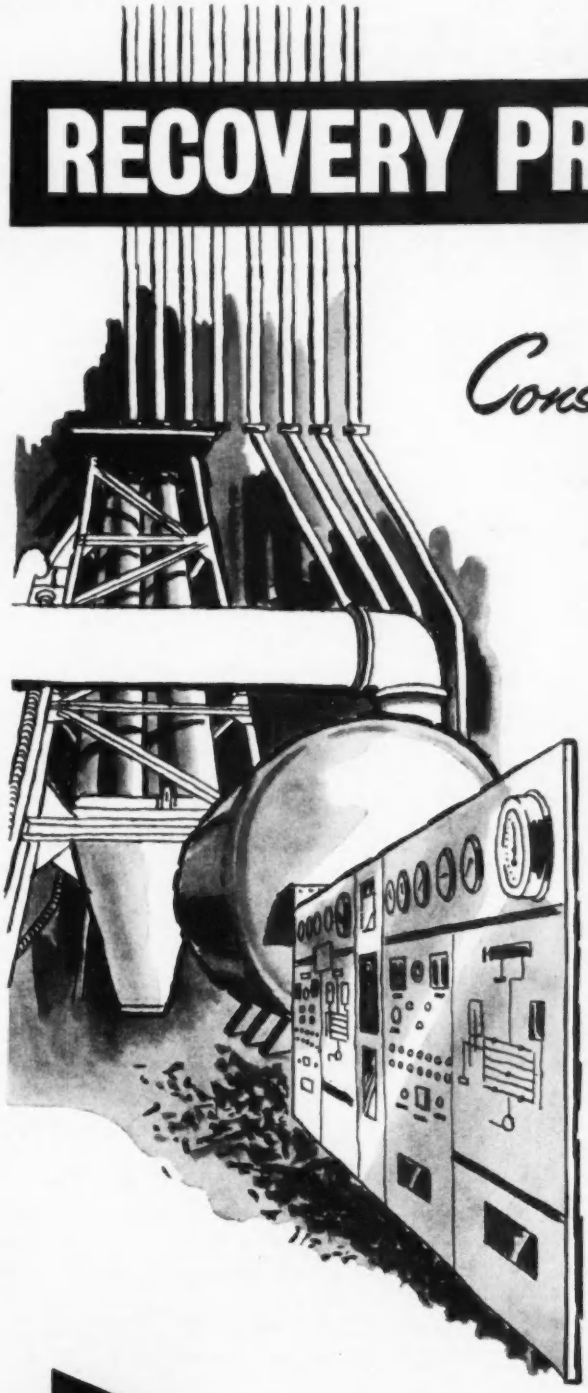
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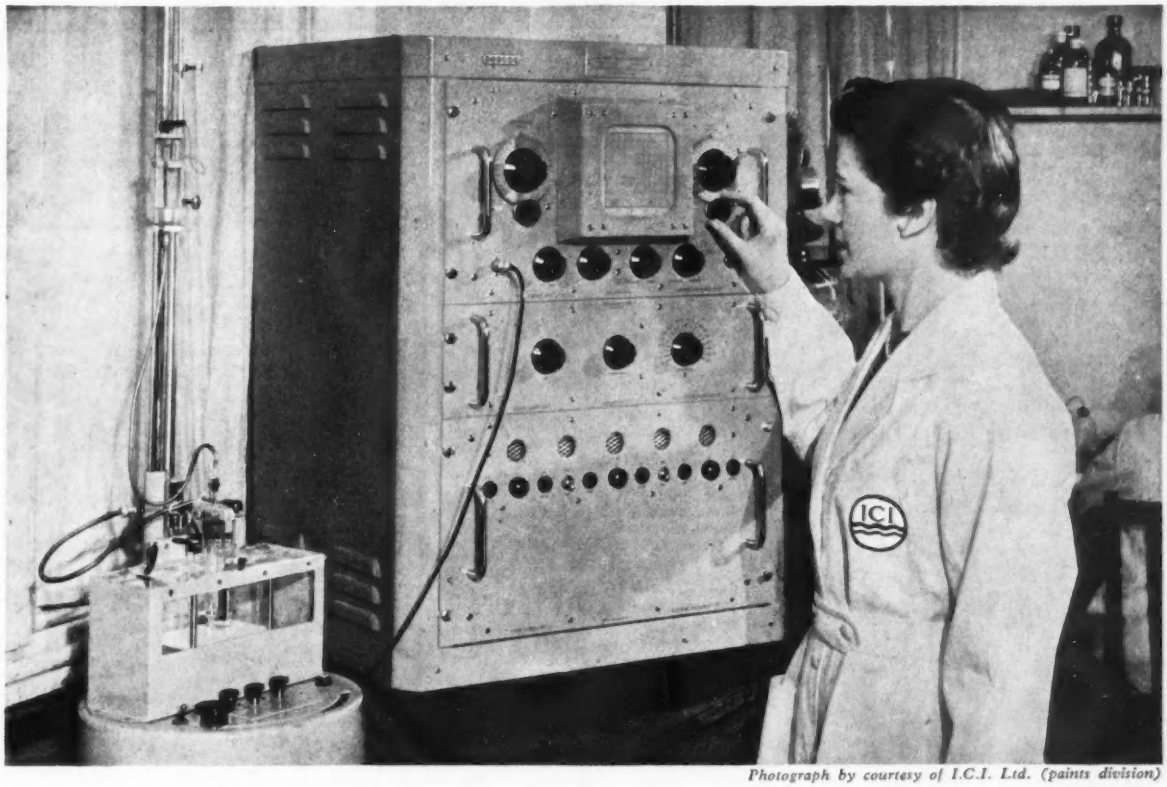
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DISPLAY. six-inch diameter cathode ray tube, with a 9cm. square graticule printed on its flat, long persistence screen.

VOLTAGE SWEEP. Rate: 0.3 volt per second (fixed). Range: 0.5 volt per sweep approximately (fixed). Start Potential: + 0.5 volt to -2.0 volts (variable). Sweep Time : One polarogram per mercury drop with seven second repetition.

PLATE ONE

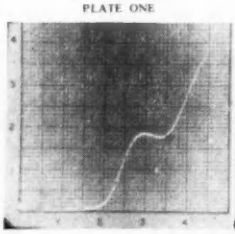
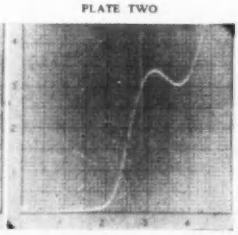


PLATE TWO



TYPICAL APPLICATION FOR CATHODE RAY POLAROGRAPH

Determination of Cyanide in Effluent Sample. Introduce 5 ml. sample into two 10 ml. volumetric flasks, into one flask add 0.2 ml. of a standard cyanide solution, (50 µg/ml. $CN^{'}$), and make each up to the mark with 0.2N NaOH. Shake well. Transfer 5 ml. from each flask into polarographic cells, and de-aerate with nitrogen for 3 mins. Record the polarograms applying anodic oxidation on start potential –0.4V and scale factor 1.0.

x µg $CN^{'}$ + 5 µg $CN^{'}$ = 34 divisions (Plate 2)

x µg $CN^{'}$ = 18.5 divisions (Plate 1)

$\therefore$ 5 µg $CN^{'}$ = 15.5 divisions

$$x = \frac{5 \times 18.5}{15.5} \text{ µg}$$

$$x = 6.0 \text{ µg}$$

Volume of sample in cell = 2.5 ml.

$\therefore$ Concentration of $CN^{'}$ in sample = 2.4 µg/ml.

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Chemical Age

ANNUAL REVIEW ISSUE

JANUARY 9 — 1960

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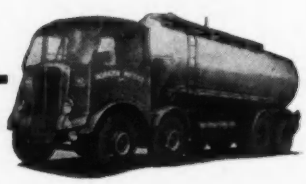
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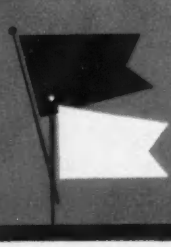
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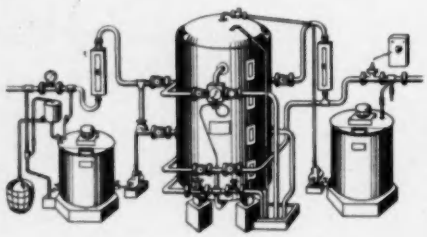
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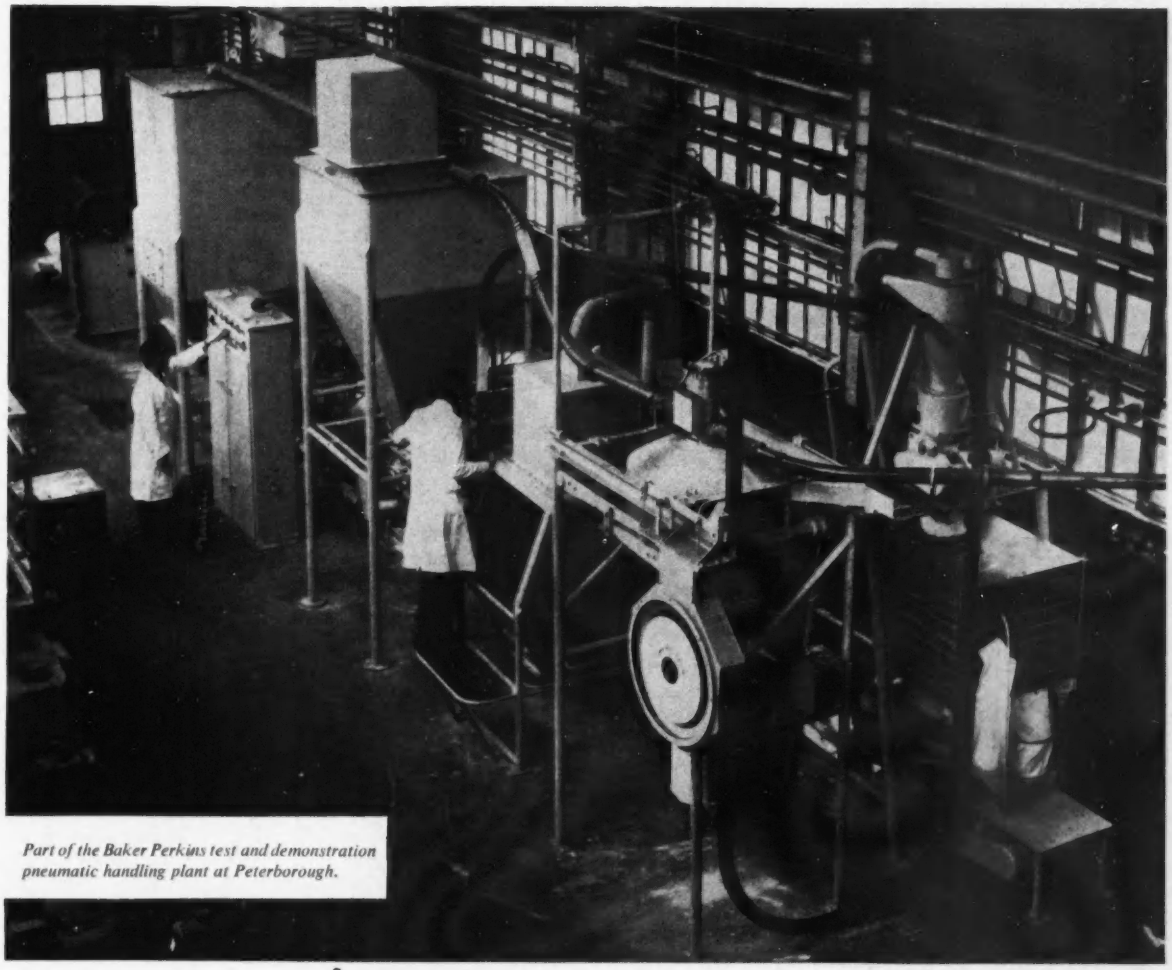
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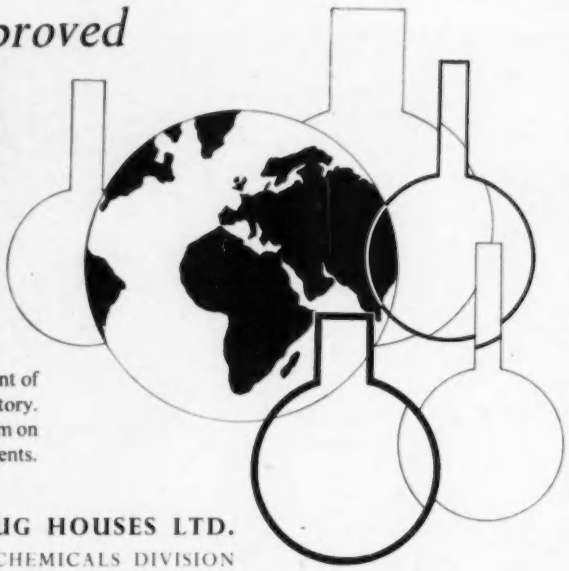
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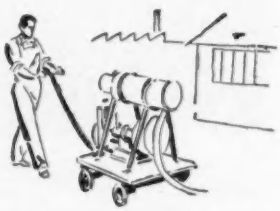
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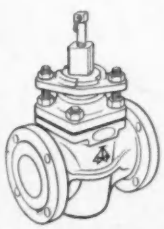
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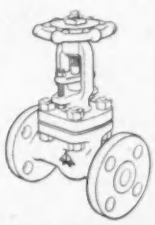
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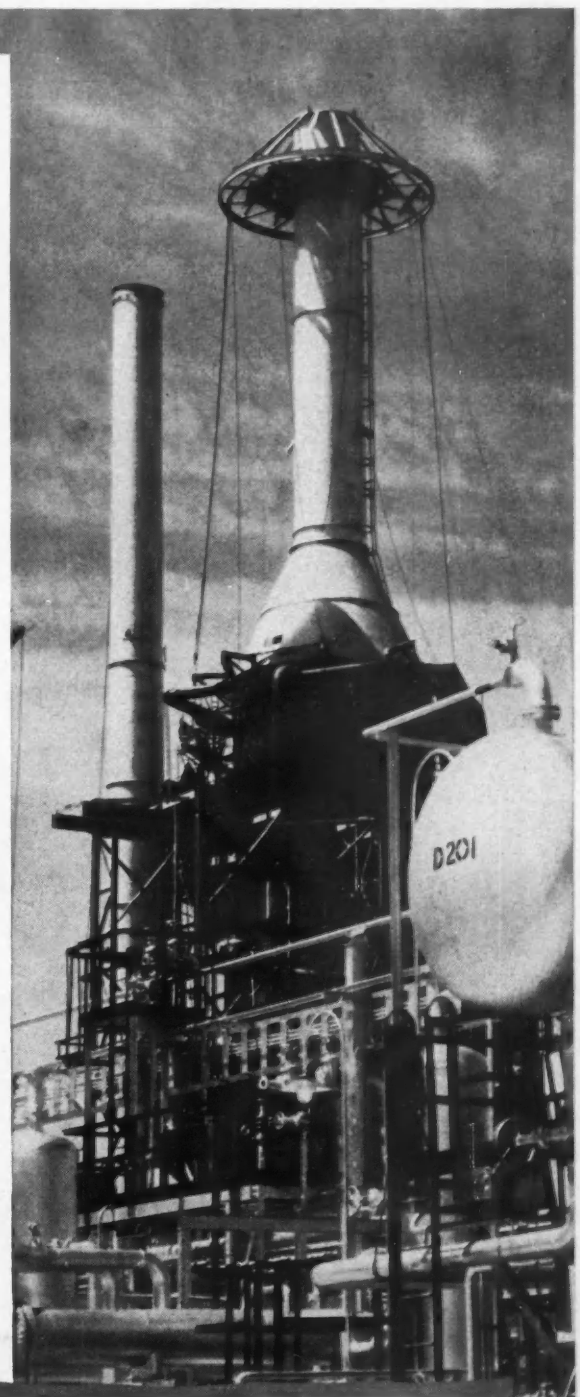


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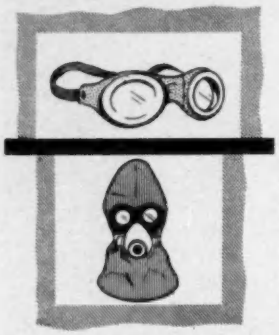
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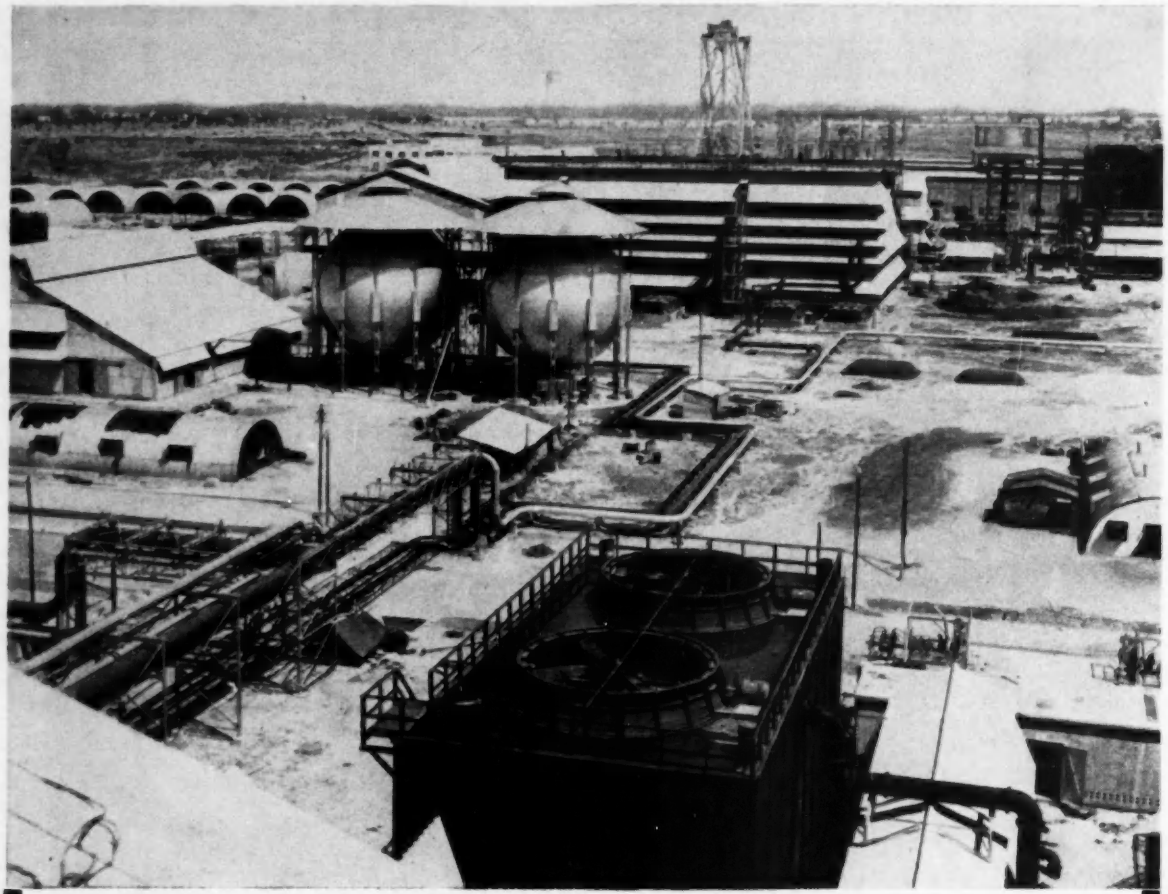
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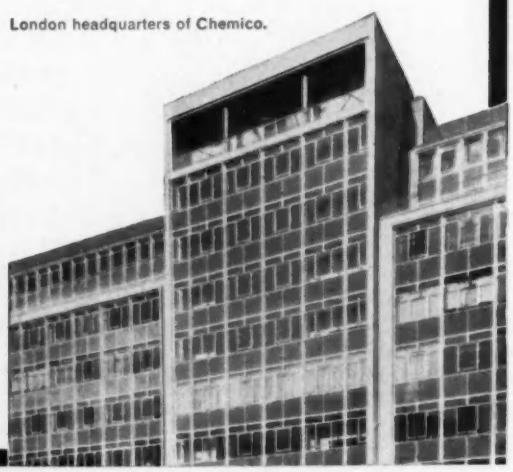


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CHEMICAL AGE

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C

HIGH POLYMERS IN U.S.

WHAT sort of markets are there for high polymers? In the part of the world where such polymers are big business—the U.S.—some interesting indications have been given at a recent meeting of the U.S. Chemical Market Research Association. The answer is a forecast of even greater consumption of plastics, resins and synthetic rubber. (*Chemical and Engineering News*, 1959, **37**, No. 47, 23).

Du Pont spokesman, Daniel D. Lanning, predicted a certain rise to the hundred-million-lb.-mark by mid-1960's for packaging films. This year consumption of packaging film will be over 600 million lb., as 100 million lb. of cellulose film and 180 million lb. polythene. The remainder will be taken up by specialised plastics films. The food industry takes about 70% of all packaging film in the U.S. and the largest single market for the remainder is the textile industry. Growth in U.S. population is the basis of the expected increase in plastics films consumption plus some new applications for such films.

At present some 22% of the total output of plastics in the U.S. is used for construction purposes (about 975 million lb. was used by the building industry in 1958). Monsanto Chemical Co. expect plastics for construction to rise to 1,300 million lb. by 1965 and to 2,000 million by 1975.

In the U.S. in 1958, about 60 million lb. of plastics were used for rigid moulded containers, 20 million lb. for squeeze bottles and collapsible tubes, 7 million lb. for sheet-formed and extruded containers, and 4 million lb. for industrial shipping containers, report the Plax Corporation. This company therefore expects total consumption of plastics to rise from the 91 million lb. in 1958 to 250 million lb. in 1965.

Over the next two or three years, use of low-density polythene for containers is expected to increase, after which polythene of intermediate and high-density will encroach on some of the low-density polythene markets. Use of high-density (low-pressure) polythene is expected to expand to more than 35 million lb. next year and to 50 million by 1961. But while the high-density material has the valuable advantage of rigidity, it has less impact resistance, and more critical processing requirements and it may develop stress-cracking, state Plax.

By 1965, at least 100 million cu. ft. of flexible foams, including both plastics and latex rubber will be used in the U.S. Dr. William C. Goggin, Dow Chemical states that total use of rigid plastics foams in 1965 are expected to reach 105 million cu. ft.—30 million cu. ft. for appliances, 30 million cu. ft. for industrial buildings, 20 million cu. ft. for domestic buildings, 15 million cu. ft. for equipment, and 10 million for packaging, buoyancy materials, etc.

Future demand for rigid plastics foams used for their thermal insulating properties, is estimated on the basis of thermal conductivity and some of the new foams are reported to have 30 to 50% lower thermal conductivity. If these new materials come to the fore for insulation purposes by 1965, the total estimate of 105 million cu. ft. may be cut to 70 or 80 million cu. ft.

In the coatings field, use of alkyd resins in alkyd-based paints may grow from 487 million lb. in 1958 to 580 million lb. in 1965, according to Allied Chemical Corporation. This company also expects consumption of binder

resins for latex paints to expand from 130 million lb. in 1958 to 200 million in 1965. At the present time about 2 lb. of binder resin are used per gallon of latex paint but Allied expect this figure to decline to about 1.5 lb./gall.

With regard to the synthetic rubber field, Goodrich-Gulf Chemicals estimated that about 2.4 million lb. of such rubber will be consumed in the U.S. this year. In 1965, U.S. consumption of synthetic rubber is expected to reach the 3,100 million lb. mark, including 224 million to 336 million lb. of polyisoprene and polybutadiene.

Lastly in synthetic fibres, nylon is still the leader with annual production at 300 million lb. of filament and 30 million lb. of staple. Output of acrylic fibres in the U.S. is estimated by Werner Textile Consultants at about 175 million lb.

Of polypropylene, the current fibre of interest, C. W. Bendigo of Werner's points out that to date no olefin fibres have been even reasonably successful and that any polypropylene fibre seen in use to date is not expected to be a commercial success. He admits however that "sooner or later the olefins cannot help but become major fibre . . . the potentials are in the hundreds of millions of pounds."

VAT-DYED POLYPROPYLENE

DISCOVERY of a simple inexpensive way of making polyolefins suitable for conventional dyeing processes is considered to be a vital factor in expanding the polypropylene field. A major disadvantage in the entry of polypropylene into the 560 million-lb.- year synthetic fibre market has been the difficulty of vat or spun dyeing polyolefin yarns and fabrics. Melt dyeing, in which colourants are added to the resin before filament extrusion has been one way round this problem. This, of course, takes dyeing out of the control of the colour-conscious textile manufacturer and limits variety of yarn colours to those the extruder chooses.

The vat-dyeing method has been the discovery of a French institute, the Institut Francais du Petrole. The process permits fibres and fabrics to be vat and spun-dyed in the full spectrum of basic and acid colours. Patents are now being sought by I.F.P. who report that the process consists of dipping polyolefin materials into a chemical reagent for one minute, then rinsing off excess in water. The chemical compound (details unknown) is used in concentrations of 10-20% and is stated to cost less than 30 cents a lb.

Success in preparing polypropylene for conventional dyeing practices was reported by Montecatini of Italy at the Milan Fair earlier this year. Professor Guilio Natta indicated that the key to vat dyeing was in chemically grafting dyeable groups on the polymer chain. Montecatini now have brightly-coloured polypropylene fabrics, both pure and in blends, that can be manufactured from staple and yarn to be produced at their 10-million-lb.-a-year plant on stream last month.

With its technique available for licensing, I.F.P. reports that it has interested a Japanese company. Also expected to be interested in the new technique are Dow, AviSun, Firestone Tire and Texas Eastman.

ANTITUMOUR ANTIBIOTICS

FOUR new antibiotics with potential antitumour ability were announced at the Seventh Annual Antibiotics Symposium, held in Washington DC. earlier this month. First details of streptonigrin, and diazomycin A, B and C were revealed by research workers of Chas. Pfizer's John L. Smith Memorial for Cancer Research headed by Dr. Koppaka V. Rav.

Streptonigrin has been isolated from *Streptomyces flocculus*. It occurs as dark brown rectangular crystals and has an empirical formula of $C_{24}H_{25}O_8N_4$. This new antibiotic has been found to be very active against adenocarcinoma 755 in rodents and also against HS-1 (a human tumour transplanted into rats), but has only moderate activity against sarcoma 180 and leukæmia 1210 in rodents. Streptonigrin can also destroy bacteria but is too toxic for use as an antibacterial antibiotic.

Observing that broths of *Streptomyces ambofaciens* showed a high order of activity against certain tumours in mice, it was discovered that activity was due to four related substances, chemically classified as aliphatic diazo ketones. One of these is 6-diazo-5-oxy nor-leucine (DON) already known and tested as an antitumour antibiotic.

Separation of diazomycin A, B, and C, from the broth proved quite a task. From a crude starting mixture, a rough separation is made by ion exchange using Dowex-1 (acetate) giving DON in the effluent; the other three compounds remain on the column. Elution with dilute phosphate buffer gives diazomycins A, B, C in that order. To obtain the compounds in a pure state the separated components are subjected to countercurrent distribution using a phenol-water system.

Diazomycins are reported to be very active against sarcoma 180 and adenocarcinoma 755 in mice. Diazomycin B, whose toxicity is similar to DON, is also moderately active again leukæmia 1210. The A and C forms are only one-tenth as toxic.

BISPHENOL-A CAPACITY

NEWS has been released by Union Carbide Plastics, Monsanto Chemical and Dow Chemical in the U.S. regarding plans to add about 45 million lb. of capacity to the present 70 million lb. capacity for bisphenol-A. Monsanto and Dow will have their extensions ready next year and Union Carbide in early 1961.

Currently the market is saturated, but capacity and production are expected to be in balance by the middle of next year. Reason for the activity in this field is that polycarbonates are entering the commercial phase. For the next year or so, however, bisphenol-A consumption will be tied to epoxy resin demands.

It is estimated that bisphenol-A output this year will total 45 million lb. Of this total 93% will be used to make epoxy resins, and the balance will be taken up by products such as polyesters, bisphenol-modified resins, brake fluids, ultra-violet absorbers and pilot-plant amounts of polycarbonates. As the epoxy resin demand increases next year and polycarbonates come into commercial production, bisphenol-A production is expected to increase by 13 million lb., but since capacity is due to go up by 20 million lb. there will be little change in the present 60% operating rate.

Present producers are Shell who use bisphenol-A for their epoxy resins, and Monsanto and Dow who sell most of their outputs. Union Carbide Plastics' 25 million lb. plant will provide some bisphenol-A for their epoxy resin production. Bisphenol production in 1961 is estimated at near 74 million lb. compared to 115 million lb. of capacity (*Chem. and Eng. News*, 1959, **37**, No. 43, 22), as adding 45 million lb. of bisphenol-A capacity means an annual outlet for 40.5 million lb. of phenol and 1.3 million lb. of acetone. Thus bisphenol-A could serve as an added outlet for these chemicals although this would depend on the future growth for polycarbonates and epoxy resins. Potential U.S. producers would be Hercules Powder and Allied Chemical, while Shell in the U.S. will shortly have on stream a synthetic phenol plant with some 30 million lb. over for sale.

Power-Gas and Davy-United Discuss Possible Merger

FOLLOWING a statement by the board of Power-Gas Corporation, Stockton-on-Tees, last week that the company was holding discussions with another engineering company regarding a possible association, the directors of Davy-United have made a similar announcement identifying the company as being involved in the negotiations.

The Power-Gas statement was made because of rumours of a possible merger. It was added that the discussions were in an early stage and that if and when any definite proposals were formulated they would be announced. If the discussions are to be dropped, then a further announcement will also be made.

Both Power-Gas and Davy-United are holding companies with subsidiaries in chemical and gas engineering and steel engineering respectively. Power-Gas assets at book value are put at £8.8 million and those of Davy-United at £10 million.

Wiltons-Lurgi Agreement on Solvent-Recovery Plant

UNDER an agreement concluded with Lurgi-Gesellschaft für Chemotechnik mbH, activated-carbon solvent recovery plants incorporating the Lurgi Supersorbon process for recovery of solvent from air are now offered on the home market by Chemical Engineering Wiltons Ltd., of Cheadle Heath, Stockport.

The agreement also covers supply of the Benzorbon or Supersorbon processes for recovery of hydrocarbons from coke oven gas and town gas, or from natural and reformed gases; and the Desorex and Hydraffin processes. The latter are respectively for purification and desulphurisation of all kinds of gases; and for dechlorination, deodorisation, etc., of water.

Laporte to Raise TiO_2 Output to 50,000 tons a Year

EXTENSIONS to be made over a three-year period to the Stallingborough Lincs works of Laporte Titanium Ltd. will increase the production capacity of the titanium oxide plant from 30,000 tons a year to 50,000 tons a year, state Laporte Industries Ltd. Although it will take an estimated three years before the target capacity of 50,000 tons is reached, increases in production will take place at intervals during the construction period.

Estimated cost of the extensions will be of the order of £3.5 million and it is anticipated that the whole of this amount will be financed out of group resources over the period.

British Titan Products are also engaged in a construction programme aimed at raising the titanium oxide capacity of their Grimsby plant by 15,000 tons, to a total of 85,000 tons and bringing the company's total U.K. titanium oxide capacity to 105,000 tons a year (see CHEMICAL AGE, 5 September, p. 259).

£9 m. Lurgi Gasification Plant for West Midlands Gas Board

APPROVAL for a plan for the West Midlands Gas Board to erect a Lurgi complete gasification plant costing nearly £9 million, at Gorsey, Coleshill, has been given by the Minister of Power, Mr. Richard Wood, who has sanctioned the board's general programme of capital development of which the Lurgi plant is the main part.

Work on the project is to begin early next year and it is hoped that the plant, which initially will supply 40 million cu. ft. of gas a day, will be in production towards the end of 1963.

Consideration was first given to the installation of a Lurgi plant in the West Midlands in 1952, but difficulties were met in finding a suitable site. Detailed plans have now been drawn up by the Woodall-Duckham Construction Co. These include the latest modifications recommended by Lurgi. The plant, it is estimated, will cost £8.845,000 and will use about 410,000 tons of coal annually, from East and West Midlands pits. In addition to the plant and machinery, transmission mains are likely to cost £740,000.

The Lurgi process is designed for the complete gasification under pressure of relatively low grade non-coking, small but sized coal. The gas produced is low in toxic constituents and in impurities and no coke is produced.

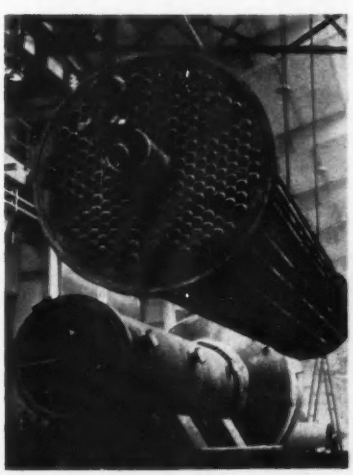
Although there is promise of developments which will increase efficiency and produce greater flexibility in operation, Lurgi plants are at present only attractive in certain favourable circumstances. The plants must be relatively large and operate on base-load. There is also a larger liquid effluent requiring special arrangements for disposal.

The Coleshill plant, which will fit in with longer-term developments being studied by the Gas Board in connection with a possible national grid, is considered to be justified on economic and operational grounds. Net saving to the Gas Board after providing for full capital charges on the plant, transmission mains and continuing charges of works closed down is estimated at £300,000 a year, without taking into account expenditure which would be necessary if the Lurgi plant were not built.

H.P. Gasification Plant for Scotland

LAST year an agreement was made between Lurgi Gesellschaft für Warmetechnila m.b.H. of Frankfurt am Main 16, and Humphreys and Glasgow Ltd., of London, in association with the Power-Gas Corporation Ltd., Stockton-on-Tees, for the construction of a Lurgi high-pressure gasification plant for the Scottish Gas Board at Westfield, Fife.

The illustration shows a tube bundle ready for sleeving in the shell of a waste heat boiler in the Stockton works of Ashmore, Benson, Pease and Co. Ltd., where this and other equipment is being manufactured for P.G. Engineering Ltd., the Power-Gas subsidiary which is handling this part of the work.



A tube bundle ready for sleeving in a boiler shell, part of the Lurgi high-pressure gasification plant for the Scottish Gas Board

Shell-Erinoid Sales Agency Terminated

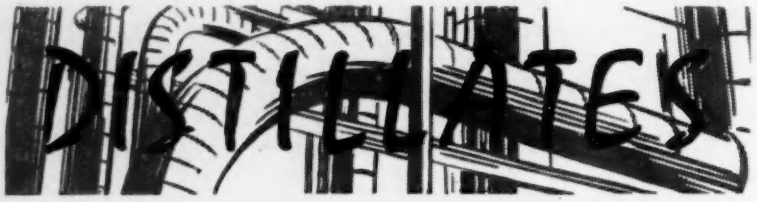
THE agency agreement under which O. and M. Kleemann's subsidiary Erinoid Ltd. have marketed polystyrene produced by Styrene Products, an associate of the Shell Chemical Co., has been terminated from 1 January next, state Shell Chemical and O. and M. Kleemann. Erinoid will no longer act as agents for the sale of Ziegler polythene produced by Shell.

From 1 January, Shell Chemical will be marketing identical grades of polystyrene under the trade name Carinex through their regional marketing organisation, and will continue to market Carlona high density polythene. Erinoid will continue to sell both their own manufacturers and their own grades of polystyrene and polythene.

The arrangements under which Styrene Products manufacture polystyrene for Kleestron Ltd., another Kleemann subsidiary, are unchanged.

B.C.L. Expand at Barrow-in-Furness Factory

First stage of expansion at the new £3,000,000 factory at Barrow-in-Furness of British Cellophane Ltd. has been started. Production began at Barrow early in 1959 to meet increasing demand for Cellophane cellulose film, and demand has continued to rise during 1959. The new plant being laid down now will be in production by July 1960.



★ IMMEDIATE public ownership of European chemical industries and the formation of a European chemical authority to control production, distribution and development of chemicals throughout Europe, are two of the measures which Councillor D. Edwards urges chemical workers to press for.

Writing in the current issue of *'The Chemical Worker'*, published by the Chemical Workers' Union, he sees them as an answer to the dollar challenge. Discussing U.S. investments in Europe, both through subsidiary plants and licensing arrangements, Edwards declares "The repercussions of this dollar invasion may well have disastrous effects on our own industry". With one of the basic industries of Europe governed by remote control, he feels that various chemicals and pharmaceuticals now able to compete on the U.S. market would be slowly forced out of production.

Perhaps the key to C.W.U. policy is revealed in the heading 'Dialectic materialism seems to work', which is followed by a statement that the Karl Marx Chemical Works of Rumania doubled its calcium carbide exports in 1958.

My only criticism of the 'dollar invasion', is that the British chemical industry has let the U.S. take the lead in establishing links with European firms; British insularity and lethargy are likely to ensure that Europe's trading plums are lost to American initiative.

★ AN ESTIMATE that A.N.I.C. are losing money on their synthetic rubber and fertiliser plants at Ravenna, Italy, to the extent of Lire 5,412 million £3.1 million) is made in *'24 Ore'*, the daily financial newspaper published in Milan. I cannot vouch for the accuracy of their figures, but readers may find them interesting. Total expenditure is put at Lire 36,348 million (£20.87 million), of which interest and amortisation at 15% of cost of plants and port expansion, accounts for Lire 15,150 million (£8.07 million).

Raw materials' expenditure is put at Lire 10,832 million (£6.3 million) which is broken down as follows: Styrene and butadiene, 34,000 tons at Lire 145 kg. Lire 4,930 million (£2.87 million); 286 million c.m. of methane for chemical use at Lire 6.8 per c.m., Lire 1,822 million (£1.04 million); plus 280 million c.m. of methane for use as fuel at Lire 10.5 per c.m., Lire 2,940 million (£1.79 million); 450 tons of chalk at Lire 1,200 per ton, Lire 540 million (£310,000); and 60,000 tons of phosphates and potassium salts for fertiliser production, at Lire 10,000 per ton, Lire 600 million (£349,000).

To the raw materials figure must be added wages and salaries (Lire 5,173 million), upkeep, about 3.5 of total invested, (Lire 3,500 million); interest on capital (Lire 800 million); overheads (Lire 712 million); tax on power consumed (Lire 180 million).

Total maximum possible receipts are put at Lire 30,936 million (£17.77 million), comprising sales of 60,000 tons of rubber at 285.6 Lire per kg., Lire 17.136 million (£9.84 million); sales of 750,000 tons of fertilisers at prices ranging from Lire 18,000 to Lire 18,500 per metric ton, Lire 13,800 million (£7.93 million).

★ AMINOTRIAZOLE has been much in the news lately in the U.S. and has even caused questions to be raised in the House of Lords here (see p. 811). The Food and Drugs Administration cracked down suddenly on sales of cranberries, traditionally eaten in the U.S. with Thanksgiving dinner of turkey, because two interstate shipments contained residues of aminotriazole used as weedkiller. In May this year, however, the F.D.A. concluded from feeding tests on rats that this herbicide caused cancer (adenocarcinoma) of the thyroid.

While aminotriazole causes cancer if fed to rats at very high levels, it is a point of scientific contention as to whether it could cause cancer in humans at any level even through relatively high consumption of strawberries, for a person would have to eat two quarts of cranberries every day for 23 days to reach the feeding levels at which aminotriazole initially proved harmful to rats —and nobody, it is pointed out, eats that many cranberries.

It is the same story again, of many growers who had been meticulous in their use of the herbicide, suffering because of the careless actions of a few. Of the U.S. producers involved, American Cyanamide and Amchem, Cyanamid acted promptly through their public relations. Within hours, they had drafted a statement and in two days placed top technical management on a television show to allay the public's fears.

★ I.C.I.'s completion of new silicon capacity bringing their total up to 4,000 lb.—they only announced the first U.K. bulk production of semi-conductor grades of silicon earlier this year—is accompanied by the news that new extensions have been planned and will more than double capacity next year. This further expansion can be carried out relatively easily as the original plant was designed for extension.

In view of these expansion projects taking place so soon after start-up of the original plant it would seem that the General Chemicals Division was either too cautious in its original market forecasts, or that the semi-conductor industry has developed faster than was thought.

Of the two types of silicon used by device manufacturers—lump or granular, from which single crystals are made and some zone-refined silicon in rod form—I.C.I. have been marketing lump material (150-500 ohm. cm., p-type). The division has been actively working on methods of growing silicon rods for zone-refining and is now installing a new plant to produce polycrystalline rods early in 1960. The rods will be up to 1 in. in diameter and up to 24 in. long.

★ DO ALL designers in industry read their own technical press and if not, why not? According to Dr. R. Weck, director of research of the British Welding Research Association, who spoke at a recent press conference to mark the launching of the association's new welding design advisory service, some of the most vital results of research do not reach designers despite publication of reports and contributions to the press.

Analysing problems encountered by the organisation, Dr. Weck told me last week that although Britain is ahead in welding design research she is behind in getting results of such research on to supply. The new scheme, which includes a mobile stress-analysis unit scheduled to come into service before the year-end, is receiving support from the Department of Scientific and Industrial Research and has as its main terms of reference the speeding up of applications of welding design and research throughout industry. Its field of action will be from 'atomic reactor vessels to motor car chassis frames'.

The new scheme should undoubtedly be a step forward in achieving the desired end. But the problem of dissemination of news relating to new developments interests me greatly. The argument, which I hear not infrequently, that it is 'impossible to read all the technical journals and also do a days work, undoubtedly has some substance. But journals are not meant to be read from cover to cover. If the editor is doing his job properly the reader will find it easy to pick from an issue the items that interest him.

★ FOLLOWING their breakaway from the oil company consortium that is building a refinery at Mersin, Turkey, Caltex are at present engaged in appointing a contractor to build their own refinery in Turkey. The consortium project involves Standard Vacuum, Royal Dutch/Shell and B.P., with Foster Wheeler as the main contractor; Foster Wheeler also hope to build the Caltex refinery, while Kellogg and Lummus have also been indicated as being possible contractors.

Caltex have recently signed an agreement with the Turkish Government for what is said to be a 20,800 barrels-a-day refinery near the Sea of Marmara at a cost of some $26 million. Of the $10 million capital, Caltex will hold 49% and the Turkish state agency, TPAL, 51%.

Alembic

More Price Cuts by Shell Chemical

FURTHER reductions in the prices of chemicals were made on Tuesday by Shell Chemical Co. Ltd. The cuts—of up to £10 a ton—affect most of the company's range of alkanolamines and both grades of monopropylene glycol. With the reductions in the prices of four solvents already announced, the company is now marketing 35% (by tonnage) of its industrial chemicals at lower prices.

Monopropylene glycol is used in the making of polyester resins, essences and pharmaceuticals, and the alkanolamines are used in the manufacture of foam promotors, in gas scrubbing processes and in other chemical manufacture.

Reason given for the reductions is that demand for these chemicals had continued to grow so that a higher production is possible. (See also 'Trade Notes', p. 828.)

Department for Pesticides Research Formed

MANUFACTURERS of the series of fluoroacetamide pesticides including 'Tritox' and 'Megatox', Associated Fumigators Ltd., 112 Victoria Dock Road, London E.16, are forming a research and development department, to be directed by their technical staff in co-operation with their consultants, M. A. Phillips and Associates Ltd.

The new department will deal, among other things, with fundamental research on residue analysis in plants, wetting problems for agricultural sprays, etc., and with commercial developments based on new compounds derived from fluoroacetamide and fluoroacetanilides and also on mercurial and non-mercurial fungicides.

In the new laboratories now being erected it is also hoped to commence work on nematocides, with special reference to systemic nematocides.

New Production Facilities for John Dore and Co.

TO INCREASE their service in supply of chemical plant for pharmaceuticals, perfumery, soap and allied industries, the firm of John Dore and Co. Ltd., 30-34 Bromley High Street, Bow, London E.3, has taken over additional premises in East London. The newly acquired factory is off High Road, Plaistow, adjacent to the East London dock area and well placed for road and rail transport.

Facilities are available for the time being for construction of plant units up to 5 tons weight and up to 30 ft. high, but extensions are projected for the coming year which will accommodate plant up about 10 tons and 45 ft. In the interim period larger plant can be handled under outdoor gantries.

The Plaistow factory will specialise in fabrication of chemical and allied plant in stainless and other steels and ferrous alloys, while the existing plant at Bromley High Street will have more room to expand the firm's well-known copper and non-ferrous manufacturing facilities.

In Parliament

Chemicals-from-Coal Committee Seeks More Written Evidence

THE Wilson Committee set up by the Ministry of Power to examine the prospects for a coal-based chemical industry is "pressing on urgently with their very detailed investigations but it may be some months yet before they are ready to report". This was stated in the House of Commons on Monday by Mr. Richard Wood, Minister of Power, who said he had been told by the chairman that the committee had reached a stage where they would welcome further written memoranda from people interested in research and development on processes making chemicals, gases and oil from coal and in the organisation of such work.

Communications on this subject should be sent to Mr. W. R. G. Bell, secretary of the Committee on Coal Derivatives at the Ministry, Thames House South, London S.W.1, as soon as possible. The committee was set up on 16 April (see CHEMICAL AGE, 25 April, p. 687) to make recommendations on further research and development on any chemicals-from-coal processes that appeared to hold promise of industrial application and as to the type of organisation best suited to carry out that work.

Chairman of the committee is Mr. A. H. Wilson, F.R.S., deputy chairman and managing director in charge of research and development for Courtaulds Ltd. Members include Dr. R. Holroyd, I.C.I., Dr. M. A. Matthews, Shell International Chemical Co., and Mr. B. E. A. Vigers, Laporte Industries.

Extracting Oil from Coal

In reply to a further question, Mr. Wood declared that the question of extracting oil from coal was being reviewed by the Wilson Committee. He was asked if he was aware that the process had been carried out commercially in South Africa and that the firm of John Brown, civil engineers, had a plant which it was claimed could do this process on a commercial basis. Mr. Wood said that the conditions in South Africa were very different from conditions that would obtain in the U.K.

U.K. Research Expenditure on Coal

Mr. Wood stated that the Government, the nationalised industries and the research associations were spending about £1.6 million a year on research, as well as increasing amounts on the development of new processes. It was his responsibility to co-ordinate those research programmes and in that he had the advice of a Scientific Advisory Council under the chairmanship of Sir Alexander Fleck. He had no figures for research spending by private firms.

In reply to a suggestion that Government spending on coal research was a pitiful amount compared with oil companies' research expenditure, stated to be six to seven times as much, Mr. Wood declared: "I do not see any point in spending money unless we can find something to spend it on."

Emission of Fluorine at Stoke-on-Trent

The Chief Alkali Inspector, in co-operation with the Chief Inspector of Factories, is examining emissions of fluorine compounds in the city of Stoke-on-Trent, it was stated recently in the House of Commons by Sir K. Joseph, Parliamentary Secretary to the Minister of Housing and Local Government. It was further revealed in a written answer to questions relating to the subject that regular information is being received, and that study of the matter continues.

Aminotriazole as Herbicide

A preparation containing aminotriazole was used in the U.K. as a herbicide, but was not recommended for use on growing crops, stated Earl Waldegrave, Parliamentary Secretary to the Ministry of Agriculture, in the House of Lords last week. He added that the Government had no evidence that it was a cancer-inducing agent and it would not be wise to ban the material. They were advised that it was of such low mammalian toxicity that examination by the Advisory Committee was not necessary.

Humglas Water-gas Plant for Australia

A CONTRACT for a blue water-gas plant that will be built at Boxhill, a residential suburb, nine miles outside Melbourne, Australia, has been awarded to Humphreys and Glasgow Ltd., by Colonial Gasholdings.

The new plant, which will cost about £A90,000, will be producing 1½ million cu. ft. of gas a day on completion at the end of 1960. The gas, which is of low calorific value, will be enriched by liquefied petroleum gas (propane).

In designing the plant, Humglas are bearing in mind the possibility of the plant being converted to make carburetted water gas.

Analysis of Phenols Present in Liquors

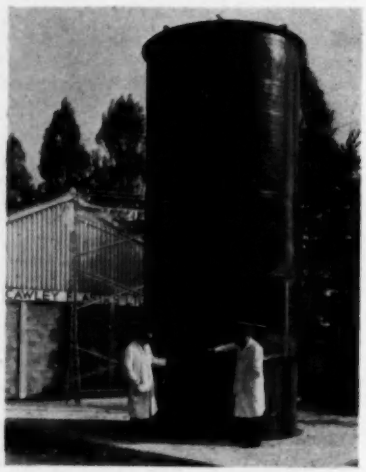
During a paper entitled 'The identification and determination of phenols' Dr. L. Barker, B.Sc., Ph.D., A.R.I.C. (Leeds University) indicated that it has been found possible to make "a relatively rapid and sufficiently detailed analysis of the phenols present in liquors solely by column chromatography and ultra-violet spectrophotometry".

The paper was read at an ordinary meeting of the Midlands section of the Society for Analytical Chemistry held recently in the Mason theatre, the University, Edmund Street, Birmingham 3.

6,000 Gall. Storage Tank by Cawley Plastics in Vybak

SOME of the largest all-plastics structures ever made are being fabricated by Cawley Plastics Ltd., Wey Lock Works, New Haw, Weybridge, Surrey, to the order of "a large chemical manufacturer", understood to be Laporte Chemicals Ltd., who, as reported exclusively in CHEMICAL AGE, 21 November, p. 731, are building the first U.K. sodium chlorite plant at Luton. The material used is claimed to be the first combination of rigid p.v.c. with a polyester resin/glass fibre laminate in which a true bond has been achieved.

The contract is for a number of process towers and storage tanks made from dual laminate material, the largest single structure being a process tower 36 ft. high and of 4 ft. internal diameter; and chemical storage tanks with capacities of 6,500 gall. are also included.



Made entirely from Cawley Plastics' dual laminate material, a strong reinforced polyester laminate bonded to a resistant internal facing of Bakelite Vybak industrial rigid sheet, this 6,000 gall. storage tank is 20 ft. high

The dual laminate used consists of Bakelite Vybak industrial rigid p.v.c. sheet, bonded to a strength-giving polyester resin laminate. The method of bonding employed is the subject of a patent application, and details are not disclosed.

In completed structures the Vybak internal facing gives the material a high degree of chemical resistance, while the bond between the two components ensures that all loads on the internal surface are transferred to the structural reinforced polyester laminate. The bond also enables the laminate to withstand high temperatures. (Fume ducting made from the dual laminate is said to have been operating for several months at temperatures in the region of 120°C.)

The thickness of Vybak used in the material is at least ¼ in. while the thickness of the polyester laminate depends on the stresses which will be imposed on the finished structure. Thus in storage tanks a fairly thick laminate is used near the base, where the load of contents is greatest, and the section is progressively reduced towards the top of the tank.

Plant made from the dual laminate weighs only about one-fifth as much as a similar structure made from rubber- or p.v.c.-lined mild steel, yet it has equal strength and load-bearing characteristics. This saving in weight enables the all-plastics structures to be installed comparatively easily, and reduces the extent of foundation work for large fabrications. Since the exterior of the structure is not susceptible to corrosion, maintenance is claimed to be negligible.

The first part of the contract includes a 6,000 gall. storage tank, made in one piece, which is to be used to hold a highly-concentrated bleaching chemical. It is claimed to be one of the largest single dual laminate fabrications made, with a total weight of ½ ton. Designed to hold contents weighing 30 tons, the inside of the laminate is composed of ¼-in. Vybak sheet. The tank, which is 20 ft. high, with an internal diameter of 8 ft., stands inside a 4 ft. high steel anchorage which is bolted to the foundations.

A process tower 24 ft. high and of 4 ft. internal diameter, weighing only 600 lb., is also included in the first part of the order. Made in three sections, each of which can be comfortably handled and carried by four men, the tower is strong enough to take the weight of four tons of tower packings. Inside, two grids made from strips of ½-in. Vybak will support these packings, one grid alone taking a weight of about 3½ tons.

The dual laminate material was developed by Cawley Plastics and has been registered under the name Tufplas.

Reclamation of Tar Product Residues With Surface-Active Solvent

A SYSTEM of reclamation of tar product residues effected by introducing a special surface-active solvent "into the globules of chemical coated dust" is offered by R. Beech and Co., 85 Talbot Road, Leeds 8. It is stated that the solids content of residues rarely exceeds 45% by weight, and that by the method (a Kemtor system) of recovery and dilution the dissipation of particles presents no difficulty.

The firm is now devoting itself exclusively to recovery of crude tar and C.T.F., and charges are claimed to be recoverable by the customer as fuel or tar solid, the price being 50 to 100 tons recovery, £10 per ton; 100 to 200 tons recovery, £9 per ton, and 200 tons and over at £8 per ton.

In the system, suitable openings are required to be made in tanks above the level of the residues for access and ventilation, and the customer is required to supply the necssary C.T.F. to act as carrier for the Beech solvents and to provide piping for pumping to storage. When necessary the customer must also heat the tank and provide lighting. The firm stipulates that it must be agreed to assess the volume of residue at 28 cu. ft. per ton and to pay an agreed sum on account weekly during operations. Tanks are deemed to be cleared when not more than four inches of liquid remains after residues have been broken.

The firm state that the "small percentage of chemicals" used in the reclamation is not harmful to boiler plates or to manufacture of steel, and the carrier is borrowed from the customer's fuel stock and returned to stock with reclaimed residue. The economics of the system are set out in detail in the literature supplied by the firm, which is obtainable on request.

Antibiotic Nisin as Food Preservative?

MORE important suggested additions to the list of foods allowed to contain preservatives, recommended in a report of the Foods Standards Committee, are for bread to contain propionic acid; for flour confectionery, cheese and certain food adjuncts to contain sorbic acid; and for various canned foods and cheese to contain the antibiotic, nisin.

The committee, whose report was published last week (H.M. Stationery Office, Kingsway, London W.C.2, price 4s 6d, plus post) also recommended that all foods at present permitted to contain preservative should continue to be allowed to do so. The committee reviewed the changes that have taken place in the food industry since the Public Health (Preservatives, etc., in Food) Regulations were framed in 1925. It was concluded that some extension of the range of foods permitted to contain preservative was justified under modern conditions.

Before deciding whether and to what extent the recommendations should be implemented, the Ministers of Agriculture and Health and the Secretary of State for Scotland, will consider any representations by interested parties. Such representations should be addressed to the assistant secretary, Food Standards Division, Ministry of Agriculture, Great Westminster House, Horseferry Road, London S.W.1, to arrive not later than 25 March 1960.

Production of Uranium Tetrafluoride

CHEMICAL ENGINEERING TECHNIQUES IN DRYWAY FLUIDISED SOLIDS PROCESS AT SPRINGFIELDS

KEY intermediate in the production of uranium hexafluoride (UF_6) and uranium metal is uranium tetrafluoride (UF_4). The chemistry of the Dryway process leading to UF_4 has been dealt with (see CHEMICAL AGE, 24 January, p. 171) but at a symposium of the Institution of Chemical Engineers, held in conjunction with the British Nuclear Energy Conference at the Royal Institute on 24 November, E. Hawthorn, L. P. Shortis and J. E. Lloyd, of the U.K. Atomic Energy Authority, Risley, Warrington, Lancashire, described the work leading to a plant carrying out the same process but using different chemical engineering techniques.

At present the bulk of the production of UF_4 is achieved by the batch operation of Dryway furnaces. This process produces material of admirable quality for subsequent reaction, but has operational and economic disadvantages which make scale-up of this type of plant unattractive. A reappraisal of the chemistry and chemical engineering of the process indicated that raw material savings could be made by the direct thermal denitration of purified uranyl nitrate to UO_3 eliminating ammonium diuranate as an intermediate and enabling nitric acid recovery to be effected. Considerations which led to the adoption of the fluidised solids system for the denitration and subsequent Dryway reactions and outlines of the development and design work which have gone into construction of a prototype production plant are given by Hawthorn *et al.* in their paper.

Starting Point

The Process. The complete process was visualised as starting with the dilute product of the solvent extraction plant at 80-90 gm. U/litre proceeding to the hexahydrate (1,120 gm. U/litre) by multiple effect evaporation, by denitration to UO_3 with recovery of the nitrous gases by conventional absorption, reduction to UO_2 by fluidisation with hydrogen and finally hydrofluorination with HF as the fluidising gas. As a target for the development work the final production plant was envisaged as a continuously operating integrated unit linking all of these stages by pneumatic transfer of solids.

In studying the chemistry—almost exclusively with the gas/solid reactions:

$$UO_3 + H_2 \rightarrow UO_2 + H_2O$$

$$UO_2 + 4HF \rightarrow UF_4 + 2H_2O$$

there proved to be a notable difference between the rates of reaction of UO_3 produced by denitration and that derived from ammonium diuranate. The reaction rates were not only much lower but it proved impossible to hydrofluorinate some of the UO_2. Much of the plans, however, involved a very high reaction rate. It was learnt, however, that addition of SO_4 to the uranyl nitrate markedly affected the reactivity of UO_3 (the mechanism of this is still not understood). Rapid reaction with HF to about 90% conversion was obtained after which the reaction went very slowly. The principal factor responsible was found to be the temperature of reduction; on steadily decreasing to 650°C great improvement in reactivity was noted.

The phenomenon referred to as 'deactivation' is explained by damage caused by sintering of the solid at active sites and resulting from exothermicity of the reaction. As a result the surface immediately accessible to the gaseous reactants is reduced and diffusion through the crystal lattice becomes the rate controlling process. With regard to the function of SO_4 it is indicated that this is removed from the particle during reduction leaving a solid with much greater surface than if the addition had not been made. Another theory suggests that by poisoning active sites the sulphate prevents local damage by reducing the rate of heat generation at these points.

Temperature Increase

With the hydrofluorination reaction by starting this at a low temperature and increasing as the reaction proceeds a greater overall rate of reaction and final conversion has been achieved. Even at these low temperatures, however, considerable surface damage occurs.

During the above studies another effect became apparent which is proving to be of major significance in production operations—the behaviour of fumes or solids less than 200 B.S.S. mesh. Sieving of fractions of these sizes from a nominally well converted UF_4 has shown them to be considerably less converted than the bulk material. This is attributed to the higher surface area to volume rate of the fumes and hence their greater susceptibility to thermal damage. Hawthorn *et al.* state that the process conditions for this reaction sequence have not yet been optimised and there still remains room for considerable increases in reactivity.

Equipment Development. Reliable valves to shut off against solids at temperature in corrosive gases, and to provide some measure of gas seal proved difficult. The 'poppet' valve developed in this work has been found quite successful. Porous metal filters, stainless steel in denitrations and reduction reactors and Monel in the hydrofluorination reactor, initially had a very short life. Lowering the operating temperatures, internal stiffening to reduce flexure, and the use of heated blow-back gas to eliminate thermal cycling contributed to increased life and reliability.

Prototype Production Unit. Design studies were well advanced when it was decided to erect a prototype unit of the production plant, because of the problems experienced with the pilot pilot, the novelty of the operations involved and the importance of the product to the nuclear power programme. Reduction and hydrofluorination stages, however, were to be operated batchwise in the prototype.

Evaporation Plant. Long tube natural circulation calandrias were preferred for this unit. Design studies showed that four such effects gave optimum thermal conservation in combination with feed preheat by condensate. Forward feed operation was selected as in this way the most concentrated uranyl nitrate solution together with the free nitric acid present was at the minimum temperature in the evaporator thereby reducing corrosion rates. Provision was made for alteration of the liquid level in the tube bundles and optimisation during commissioning is reported to have resulted in appreciable increase in evaporative capacity.

Pressure in the fourth effect separator is maintained constant by a controlled inbleed to the vacuum manifold. The temperature in the fourth effect is then used as a measure of concentration, a temperature controller adjusting to the offtake of concentrate from the plant. Level controllers stepped back to the previous effect determine the rate of feeding of uranyl nitrate forward.

Ring-packed Sections

Each separation has ring-packed sections whereby excellent disentrainment is achieved. Distillate from the second, third and fourth effects being very low in uranium and containing a small concentration of HNO_3 is used in the backwash stage of the preceeding solvent purification plant.

Denitration Plant. The pilot plant utilised electrical resistance heating to supply the energy required for denitration. For the full-scale plant other methods were considered including fused-salt and liquid metal systems, but because of general lack of engineering 'know-how' on the former this method was discarded, and although the authority has considerable experience of the latter the extra hazards associated with this heating medium could not be justified on this plant. Results of further development indicated temperature could be reduced to 300°C and gave the opportunity for using, organic heating fluids such as Dowtherm, terphenyl or the various organo-silicates. These systems showed considerable savings could be effected compared with the use of electricity, but tests with these organic media in contact with uranyl nitrate-nitric acid mixtures showed that the possibility of explosive

decomposition could not be completely ruled out, hence the use of an electrical heating system.

Height of the reactor was fixed first of all by the length of the heating tubes which had to be covered by the fluidised solids, by the fact that development work indicated that the atomiser should be located at a fixed distance above the heating elements and below the bed level. Above the bed level allowance was made for disentrainment and space to accommodate the porous stainless steel filter banks used to separate the solids from the gas.

Air is supplied to the reactor from a Nash-Hytor compressor. Nitration gases leaving the reactor are fed to the common atmospheric absorption plant used for HNO_3 recovery.

Six branches together with withdrawal equipment are provided in the reactor vessel for insertion of the atomisers. Uranyl nitrate, atomising air and jacketing steam are supplied to each of the nozzles by flexible connections. Individual metering of air and feed liquor by rotameters is provided to each nozzle.

In the design of the continuous plant it was arranged that UO_3 would flow from the bottom of the denitration reactor into a cooler operating as a fluidised U-tube sealing subsequent gas circuits against the nitrous gases in the reactor. Cooled solids were sieved and the oversize crushed in a hammer mill. Bottom off-take was selected as it was felt that the larger material might segregate and collect in the base of the reactor. Sized solid was lifted by pneumatic conveying to a UO_3 storage hopper. Stainless steel has been used throughout the system against the high temperature of operation.

Batch Operations

Reduction Plant. Optimum diameter of this vessel was based on the gas rates required for fluidisation (many times that required for reaction). In batch operations heat has to be supplied initially and then removed. This has been achieved by an electrical resistance heating unit built on to a reactor shell but with channels through which cooling air can be directed over the vessel by suitable fans. The bed volume necessary for reaction and the surface area required for heat removal have determined the heights of the reactor containing solids. Additional volume has been provided above the bed level, together with disentrainment section of enlarged diameter containing the solids filters.

UO_3 was in the original design to be fed to the reduction reactor and the product hoppers by means of the reciprocating feeder mentioned above. In the case of batchwise operation it is necessary to meter UO_3 withdrawn from the reactor and to do this a metering vessel was interposed between the reactor shell and the transport system which conveys the UO_3 to the storage hopper. All valves handling solids are of the 'poppet' type.

Provision for filtration of the off-gases, heat exchange between inlet and outlet gases, and recirculation of the excess hydrogen using a Nash-Hytor type compressor have been made. The compressor has had the dual advantage of condensing the water of reaction, and when sealed with a weak caustic solution, of scrubbing H_2S from the off-gases formed as a result of sulphate additions to the uranyl nitrate feed.

Hydrofluorination Plant. The two reactors of this plant were fabricated throughout in Inconel. With the change-over to batchwise operation each reactor was modified to be used for completion of an hydrofluorination reaction. Off-gases from each of the reactors are fed to condensers of the HF recovery system.

HF Recovery Plant. The reaction to produce UF_4 forms water and the objective of the HF recovery system is to reject this water from the hydrofluorination system. In batch operation dilute HF is fed to the bed of UO_3 and as the reaction proceeds the off-gas progressively increases in HF concentration: the off-gases are condensed in brine-cooled condensers.

It was intended that the first runnings —mainly water—would be neutralised and discharged to drain. Subsequent condensate would be sufficiently high in HF to justify its recovery or re-use. While less than azeotrope composition (AHF) this could be fed direct to a distillation column operating on the weak HF side of the azeotrope separating water of reaction as overheads and recycling azeotrope from the reboiler to a dilute HF (DHF) stock tank. When the condensate rose to above the azeotrope it could be fed direct to the DHF tank. The reaction is continued by feeding AHF to the solids and condensing the diluted gas rich in HF and returning it also to the DHF stock tank. As the reaction nears completion off-gas composition rises almost to that of AHF; this condensate would be returned to the AHF stock tank.

Self-draining

This plant was constructed throughout in Monel "because of its superior resistance to corrosion by HF". To achieve a tight design all vessels actually containing HF were designed for a pressure of 250 p.s.i.g. irrespective of actual working pressure. Forged "weld-neck" flanges have been used throughout. All valves have bodies either forged or machined from solid bar. Extra long glands have been provided and packed with p.t.f.e. chevrons, and spindles have a ground finish. Layout of the plant was arranged to be virtually completely self-draining, with adequate provision for washout with water and alkali solution.

Commissioning. A number of major problems which were not revealed by development work or anticipated had to be overcome. The evaporator plant was commissioned with only minor troubles. Fluidisation of the denitrating reactor resulted in very severe bumping, and heat transfer from the electrical elements was found to be severely limited and many failed because of excessive temperature. These effects were due to poor gas distribution. Multi-point gas distribution reduced bumping to negligible proportions.

Denitration was commenced and apart from a few minor problems, the atomisers operated satisfactorily. Marked differences in particle size distribution of the product were noted: there was a larger concentration of fines rather than oversize material. The solids withdrawal system gave considerable trouble, it being found necessary to supply dry air to all points containing cold solids. Instability of the U-tube seal and the complexity of the flow paths resulted in frequent stoppages. Because of the absence of oversize solids the method of take-off of solids was modified to provide a vertical over-flow pipe within the reactor passing through the base and discharging directly into the pneumatic transport system lifting the UO_3 to the storage hopper.

Similar vibration troubles were experienced with the reduction reactor. Modification to a multi-point distribution system resulted in a smooth fluidisation.

Difficulties experienced with the hydrofluorination unit have largely resulted from deficiencies in the HF recovery plant. Condensation of dilute HF in the presence of solids has given rise to trouble that has only been overcome by greatly extending the trace heating of lines throughout the plant. Low once-through HF efficiencies have been achieved resulting in long reaction times and accumulation of considerable quantities of water of reaction and dilute HF in the system. It is believed that this is associated with a large proportion of fines leading to excessive gas by-passing and possibly to low reaction rates because of deactivation. Fines are produced in the denitration stage but increase because of breakdown as the solids progress through the reactor and transport systems.

First major difficulty occurred during erection when spot radiography revealed that the standard of welding was not adequate to contain HF under pressure. Due to difficulties with feed pumps to the HF boilers, the feed has been effected by pressurising the HF stock tanks with nitrogen. The most favoured type of pump at present is a totally submerged, remotely operated diaphragm pump.

Corrosion Problems

Corrosion in the dilute HF circuit has given and still is giving trouble. It is known that corrosion rates are greatly enchanced by the presence of 0.1% or more oxygen in contact with Monel holding dilute HF. Some difficulty has been experienced in keeping oxygen below this limit in the system and in order to achieve this a small proportion of hydrogen is now bled into the hydrofluorination system gas circuit. Corrosion of the vessels has been detected and choice of suitable joint rings has proved a problem. Various forms of Monel rings have now been tested and should prove satisfactory.

Conclusions. The prototype fluidised solids Dryway process has now been in operation for some months and production of UF_4 to the required specification has been achieved. Difficulties that have had to be faced in this prototype plant have been more than were expected. With the experience gained, however, commissioning of the new units of the second uranium plant is expected to proceed more smoothly. Ultimately development of the fully continuous process will be concluded.

War Office Takes Over M.o.S. Research Stations

TAKE over by the War Office of a number of establishments formerly the responsibility of the Ministry of Supply, carried out last week, has involved the transfer of some 42,000 staff who formerly came under the Ministry, about 30,000 of whom are industrial employees. As a consequence of the new arrangements it is stated that the user and the provider of equipment and weapons will be more closely associated than in the past.

The establishments taken over by the Army are: the Armament Research and Development Establishment, Fort Halstead; the Clothing and Stores Experimental Establishment, Farnborough; the Fighting Vehicles Research and Development Establishment, Chertsey, and its Armaments Wing at Kirkcudbright; the Military Engineering Experimental Establishment, Christchurch; the Porton Group (chemical and microbiological research establishments); and the Proof and Experimental Establishments at Beckhampton, Wiltshire; Eskmeals, Cumberland; Shoeburyness; Inchterf (Glasgow); Melton Mowbray; and Pendine, Caernarvonshire.

For a complete list of former Ministry of Supply establishments now the responsibility of the Ministry of Aviation, see CHEMICAL AGE, 28 November, page 770.

A.B.C.M. Publish Packaging Convention Proceedings

Proceedings of the packaging convention organised by the Association of British Chemical Manufacturers on 9 and 10 September in conjunction with the Packaging Exhibition held at Olympia have now been published. Copies are available from A.B.C.M., 86 Strand, London W.C.2, at a cost of £1 1s post free.

Papers, with discussion, were: 'Internal and external coatings for steel drums', Part 1 by R. M. C. Logan (Metal Containers Ltd.), Part 2 by D. J. S. Shaw (Robt. Ingham Clarke and Co.) and Part 3 by Dr. H. B. Footner (Shell International Petroleum Co. Ltd.); 'Influence of high-speed filling on design of consumer packages', by R. Martyn (Mardon Son and Hall Ltd.).

Flameproof Equipment for Ammonia Gas Areas

USERS of flameproof equipment in atmospheres where ammonia gas may be present will be interested in an amendment to British Standard 229:1957, 'Flameproof enclosure of electrical apparatus'. The amendment alters the standard by removing ammonia from Group II.

This presents several problems and, pending the solution of these, the committee responsible has agreed that enclosures meeting the requirements of Group I should be regarded as being suitable for ammonia risks.

When a final decision is reached, a further amendment will be made to B.S. 229.

NEW PRECISION PROCESS FOR WET AND DRY GRINDING

PRECISION fine grinding of a wide range of materials is the subject of a new process recently placed on the market and soon to be manufactured under licence in the U.S. Called the Vibro-energy mill, it utilises a patented vibro-energy system for both wet and dry grinding, and it is claimed that the equipment will make obsolete the use of the ball mill in many industrial applications due to its ability to process materials at a lower cost and to grind them more finely. It is said to perform many grinding operations which are now accomplished by methods such as fluid energy, chemical precipitation and other similar means.

Early research work behind the new type of mill was undertaken by W. Podmore and Sons Ltd., of Stoke-on-Trent, in consultation with Wm. Boulton Ltd., of Burslem, Stoke-on-Trent, who had produced equipment for Podmore's utilising a special type of vibratory motion. The joint development programme that followed resulted in the present line of equipment, and exclusive patents on the process are now held by the joint firms, and the two British firms have entered into contract with the Southwestern Engineering Co. (SWECO) of Los Angeles, California, for the manufacture and marketing of Podmore-Boulton Vibro-energy Mills in the U.S. and other parts of the Western Hemisphere.

The new type of mill uses the principle of the Boulton Gyratory Screen, which applies high frequency vibrations and circular movement to a special type of grinding media, which in turn grinds the charge of raw material. The amplitude of vibration and the degree of movement can be delicately adjusted to the nature of the raw material and the end product.

Grinding into the sub-micron ranges; grinding time reduced as much as 75%; space requirements reduced to 1/16th of that of a ball mill for a comparable output, less contamination and aeration of product, controlled heat, easier sampling inspection and easier draining and cleaning, are among the claims made for the system.

The mills can also be adapted to continuous open or closed circuit production grinding or to batch grinding, and include the vibro-energy mill for wet grinding and the fluidised vibro-energy mill for air classification for dry grinding. One of the most interesting things about the new mill is said to be the wide variety of materials which can be processed, which include pigments for paint, ink, ceramics, powdered metals, paper coatings, pharmaceuticals, and a wide range of metallic and non-metallic minerals.

Very Few Useful Drugs Discovered by Chance Observation, says Dr. Rose

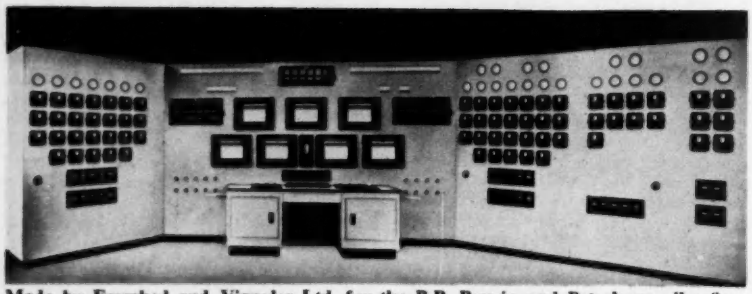
THE many erroneous ideas which exist concerning the manner in which drugs are discovered and developed was pointed out by Dr. F. L. Rose, research manager, Imperial Chemical Industries Ltd. (Pharmaceutical Division), when he spoke on "The Search for New Drugs" at a meeting held jointly by the London Section, Royal Institute of Chemistry with the College Scientific Society, at the Woolwich Polytechnic. The view that new drugs are discovered from chance observations is quite misleading; very few useful drugs have been developed on these lines. The suggestion that drug research has an entirely rational and fundamental basis is equally erroneous for the bactericidal activity of the antibiotics streptomycin and tetracycline could not have been deduced from their molecular structures.

Search for new drugs involves the cooperation of chemists, biochemists and biologists. The function of a particular cell and the chemistry of its enzyme processes may be studied, and attempts can then be made to produce substances which will disorganise the chemical reactions taking place in the cell. The drug must be a stable, non-toxic substance, which if administered orally must be capable of resisting the action of the digestive enzymes, of being absorbed through the intestinal walls into the blood stream, and of surviving the metabolic processes of the body.

Work carried out on Johne's bacillus leading to the isolation of a growth-promoting factor, mycobactin was described by Dr. Rose; the identification of N-hydroxy-lysine residues in the molecular structure of this compound; and the subsequent search for substances capable of destroying the effect of the growth factor. The lecturer then went on to discuss the antitubercular activity of Bunte's salt, and the recognition of ethyl mercaptan as being the effective chemotherapeutic agent. The use of diethyl thio-iso-phthalate as a potential antitubercular drug was referred to, as well as its application in the treatment of leprosy.

Meldola Medal for 1959

Next award of the Meldola Medal, the gift of the Society of Maccabaeans, will be made early in 1960 to the chemist who, being British and under the age of 30 at 31 December 1959, shows the most promise as indicated by published chemical work brought to the notice of the council, Royal Institute of Chemistry before the end of 1959.



Made by Evershed and Vignoles Ltd. for the B.P. Benzin und Petroleum oil refinery at Dinslaken, Germany, this control panel, though compact, accommodates all the 120 separate loops required for operation of the refinery

Large Evershed Control Panel for B.P.'s German Refinery

LATEST developments in the electronic control of petrochemical plant are embodied in the equipment prepared for the B.P. Benzin und Petroleum Aktiengesellschaft Dinslaken oil refinery by Evershed and Vignoles Ltd. of Acton Lane, Chiswick, London, which contains only two recorders for each panel, permitting the recording of plant parameters from 16 points distributed throughout the factory.

Since the first application of electronic process-control equipment to an oil refinery, in the SO_2 extraction plant at Llandarcy in South Wales in 1951, there have been numerous further applications for such systems in the industry, and the technique has become an accepted and essential feature of modern process engineering.

The refinery being constructed at Dinslaken by the Kellog International Corporation will initially cover some 300 acres and is designed for a throughput of 100,000 barrels per day. It is linked by six pipelines with extensive newly constructed tanker loading facilities embodying a tank farm at the Rhine terminal, about four miles east of the refinery, while road and rail access to the plant itself is also available.

Instruments operating on the Evershed electronic repeater principle for the distant transmission of plant variables are not basically different from those originally employed at Llandarcy. But the original process controller in the Mark I panel has passed through a number of development stages from electro-mechanical to electronic static operation, and the flexibility of the system has facilitated the introduction of latest techniques without creating obsolescence in any sections of the layout.

The control unit for Dinslaken contains the process controllers, indicating and recording facilities, supervisory instruments and manual control provisions for two crude distillation plants. It also controls a hydrofiner, a catalytic reformer and a re-distillation unit; accommodating with great economy of space each of the 120 separate control loops required for operation of the refinery.

Extensive use of 'in-line' scanners aids reduction to the minimum of supervisory personnel, and during satisfactory operation of the refinery an unbroken shadow line is presented to the operator, any break in which pin-points deviation from desired conditions and also indicates magnitude and direction.

The plug-in recording facilities embodied in the apparatus have been made possible by an inherent feature of the maker's electronic repeater measurement system, which compensates automatically for any additional display or recording instruments temporarily inserted into the measurement circuit.

All-glass Cooler for Chlorine



'World's largest' all-glass cooler leaving the Stoke-on-Trent premises of Q.V.F. Ltd. for Celulosa Argentina of Buenos Aires. Capable of cooling up to 40 metric tons of chlorine per day, the plant comprises 40 by 60 sq. ft. glass coolers mounted in four vertical banks, with a cooling surface of 2,400 sq. ft.

Letter to the Editor

SunOlin and Montecatini Urea Process

SIR,—The statements published in CHEMICAL AGE, 31 October, p. 615, under the heading "SunOlin Modify Montecatini Urea Process" have been brought to my attention and I feel that your readers as well as Montecatini are entitled to a clarification.

In the first place you mention "major engineering improvements" by Olin Mathieson and Sun Oil ensuring a "new level" of quality of crystalline and prilled urea, and to prove your point, you quote exactly the specifications which, among others, are guaranteed by the original Montecatini process. The writer knows these specifications well because he was instrumental in discussing and establishing said guarantees.

From there you go on to explain that contributing to this "new level of quality" are processing steps and techniques which "virtually eliminate corrosion and result in a basically pure product". Since virtual elimination of corrosion resulting in a basically pure product is also guaranteed under the original Montecatini process, I should like to emphasise—without the slightest intention of questioning the engineering abilities of Olin Mathieson and Sun Oil—that the particular specifications and achievements mentioned in your article are the exclusive results of Montecatini's long manufacturing experience and continuous engineering improvements.

On behalf of Montecatini, we shall appreciate any effort made by you to correct the described situation.

Yours, etc.,

MARIO L. OTTOLENGHI,
Vice-president.

Novamont Corporation,
New York 4, N.Y.

(The article was based on information supplied by Olin Mathieson Chemical Corporation, Chemicals Division, Baltimore, Maryland.—*Editor.*)

Admittance of Public to Trade Marks and Designs Hearings

The Board of Trade have laid before Parliament rules made under the Trade Marks Act, 1938, and the Registered Designs Act, 1949, providing for the admittance of the public to the hearing of certain trade marks and designs matters by the Registrar. The new Amendments require the Registrar to hear in public any dispute between two or more parties in connection with a trade mark or an application to register a trade mark, or any dispute relating to a registered design, unless, after consultation with the parties represented at the hearing, he otherwise directs. Hitherto the public have had no right of admission to such hearings. The new rules come into operation 22 February.

Copies of the new rules can be obtained from H.M.S.O., Kingsway, London W.C.2, and branches. They are the Trade Marks (Amendment) Rules, 1959, S.I. 1959 No. 1925, price 3d (by post 5d) and the Designs (Amendment) Rules, S.I. 1959/1924, 2d (by post 4d).

Overseas News

AUSTRALIAN PRODUCTION OF SULPHURIC ACID IN THIRD QUARTER

THE Australian Government has now released production statistics of the country's sulphuric acid industry in the third and fourth quarters 1958-59 compared with the fourth quarter 1957-58. Figures for the third and fourth quarters 1958-59 for superphosphate production are subject to revision.

Raw Materials (tons)

	1958-9 4th Qtr.	1958-9 3rd Qtr.	1957-8 4th Qtr.
Imported brimstone for Acid-making	40,943	40,440	40,264
Other purposes	3,343	3,391	2,957
Pyrites	66,250	61,829	62,891
Zinc concentrates	41,694	37,897	36,156
Spent oxide	2,452	2,674	3,836
Lead concentrates, alkylation sludges and H_2S	71,244	69,470	76,875

Sulphuric Acid Production (Mono-tons)

Ex-Imported brimstone	120,061	118,440	144,227
,, Pyrites	85,755	78,731	77,963
,, Zinc concentrates	32,535	29,573	27,743
,, Spent oxide	2,454	2,853	3,875
,, Lead concentrate, alkylation sludges or H_2S	20,996	18,776	19,612
Total production	261,801	248,373	273,390
By contact process (%)	46.2	46.2	39.6

Sulphuric Acid Consumption (Mono-tons)

For Superphosphate	197,662	184,508	211,472
,, Ammonium sulphate	18,413	18,654	20,700
,, Other purposes	47,423	41,417	39,224
Total consumption	263,498	244,579	271,296

Superphosphate Production (tons)

Made	583,546	534,765	617,062
Sold	856,692	888,524	782,621

B.N.S. to Build Nylon Yarn Plant in South Africa

A £200,000 plant to produce crimped nylon yarn will be built in the Cape Town area, according to Mr. T. C. Wootton, of British Nylon Spinners Ltd. in Cape Town last week. The factory will be the first of its kind in South Africa, and be equipped with its own dyehouse. A new company, Nylon Processors of South Africa (Pty.) Ltd., has been established to control the plant's operations. Production is expected to begin in the middle of 1960, and build up to full capacity over the following 12 months.

South African Firms Seek Higher Duties

The Union of South Africa Board of Trade and Industries have received from two firms, National Chemical Products Ltd., P.O. Box 344; and Germiston and Sasol Marketing Co. Ltd., Box 11437, both of Johannesburg, applications for increase of customs duty on certain chemicals, to 25% *ad valorem* or 3s per gallon, whichever is the greater: Acetone; methyl ethyl ketone; methyl isobutyl ketone; methyl n-butyl ketone; diacetone alcohol; amyl acetate; butyl acetate; secondary butyl acetate; isobutyl acetate; ethyl acetate; ethyl acetate; propyl acetate; isopropyl acetate; methyl amyl acetate, amyl alcohol; butyl alcohol; secondary butyl alcohol; tertiary butyl alcohol; isobutyl alcohol; methyl isobutyl carbinol.

Identifying Dicarboxylic Acids in Alkyd Resins and Polyesters

A rapid technique for identifying the 11 dicarboxylic acids commonly used in manufacturing alkyd resins, polyesters, and plasticisers has been developed by G. G. Esposito, Aberdeen Proving Ground, Ordnance Corp., U.S. Army (Order PB 151,033 from Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.). Microscopic examination of crystals of the free acids formed by hydrolysis of their dipotassium salts shows distinct characteristics which can be used to obtain rapid identification of each of these acids in coating materials. Photographs, drawings and an isolation scheme to assist in obtaining positive identification are included in Esposito's report.

N.S.W. Rutile Production to be Raised

Last year's production of rutile by National Mineral Holdings Ltd., who have deposits at Redhead, New South Wales, is to be increased by 50% with the installation of Australia's largest plant. Production of zircon concentrates in Australia in 1958 totalled 60,257 tons, some 68% below the record level of 1957. The decrease was due to lower rutile production.

W. German Firm Doubles Benzole Capacity

The West German benzole and allied products producer BV-Aral AG, of Bochum, has doubled its benzole capacity by bringing into operation a second installation at its Gelsenkirchen plant. The daily capacity of the plant now stands at 24 cu. m. of pure benzole or toluol or xylol. Base for BV-Aral's products in this field is the crude benzole delivered by pipeline from the nearby chemical producer Scholven-Chemie AG. The new plant is air-cooled and to a large extent electronically controlled.

India Places Large Order for Fertilisers in W. Germany

A large order for nitrogenous fertilisers has been given to two West German firms by the Indian Government through the India Store Department in London. The orders are for £454,200 worth of ammonium sulphate fertilisers from the Ruhrstickstoff AG concern of Bochum and for £151,400 worth of the same product from Düngemittel GmbH, of Ludwigshafen-on-Rhine.

Pure Hydrogen from U.S. Van de Mark Chemical Co.

Hydrogen of 99.99% purity is now being produced by the U.S. concern Van de Mark Chemical Co. from waste refinery gases. In the preparation process the first stage is the catalytic isolation of oxygen. CO_2 is then separated by a washing-out process involving the use of alkalis. After the washing phase, molecular sieves act both as a drying medium and as adsorbers for CO and N_2. Finally, hydrocarbons are isolated with activated carbon at temperatures of around minus 190°C and the hydrogen so produced has the qualities of electrolytic hydrogen.

100% Methyl Acetate Production in East Germany

Research workers at the East German State-owned synthetic rubber and chemican concern VEB Chemische Werke Buna are reported to have developed a 100% grade of methyl acetate which can be produced in standard qualities, and production is said to have commenced.

Cyanamid Set-up Joint Italian Company

A new company with capital equivalent to 2,400,000 U.S. dollars has been set up in Catania, Italy, under the name of S.p.A. Cyanamid Italia. The company's shares are held 70% by the American Cyanamid Corporation, of New York, and 30% by the Italian Franco-Gorgone Group. The new concern is to set up a plant in Catania for the undertaking of chemical, pharmaceutical and metallurgical production and will also concern itself in certain geological prospecting.

Experimental Phosphate Reduction Plant at Dorowa

A £70,000 experimental reduction plant has recently been installed at the new phosphate ore mine at Dorowa, some 40 miles from Imjazura, South Africa. It was recently opened by Dorowa Minerals Co. Ltd.

It is estimated that over £700,000 a year is spent by African Explosives and Chemical Industries Ltd. on importing phosphates from North Africa. It is expected, however, that in the near future Dorowa will be in a position to supply all the ore required by local fertiliser manufacturers for at least the next 40 years.

Hercules to Build 100-million lb. Polypropylene Plant

Hercules Powder are to build a 100 million lb.-per-year polypropylene plant at Lake Charles, La., U.S. Construction is to begin immediately and the completion date for the first 50 million lb. unit is scheduled for early 1961. Propylene will be supplied by Petroleum Chemicals Inc.

This will be Hercules second polypropylene plant. They already have a 50

million lb.-per-year plant in Parkin, New Jersey, which is producing both polypropylene and polythene.

Stanvac Petrochemical Plans in Malaya

Plans to set up a petroleum refinery and chemical fertiliser plant in Malaya have been announced by Standard-Vacuum Oil Co., U.S. General manager, H. L. Beemer, stated in Kuala Lumpur last week that this proposal was part of Stanvac's investment programme in Malaya, and that applications for 'pioneer' (tax-free) projects had been submitted to the Government.

Monsanto Capital for New Spanish Chemical Concern

Monsanto Chemical Co., U.S., have been authorised to participate on a fifty-fifty basis in a new Spanish chemical company to be formed under the recent foreign investment law. Participation will be in the form of a subscription to half the 90 million pesetas capital of the new company, to be known as Acetorgan.

A credit of $1.8 million will be granted by Monsanto to the new company.

Common Market Members Discuss External Tariff

At a meeting on 1 December, the council of ministers of the Common Market discussed the external tariff of the area, particularly the problems of the List G Tariff, a list of 70 items for which the C.M. tariff was not fixed in the Treaty of Rome. So far agreement has been reached on 29 items, which are believed to include sulphur.

Grace's Trinidad Fertilizer Plant is 60% Complete

Initial unit of the Trinidad plant of W. R. Grace subsidiary, Federation Chemicals Ltd., for the production of fertilisers is now more than 60% complete. The company expects to have one of its four plants in operation by the end of 1959. This will be the ammonia unit which will produce about 40,000 tons a year. The other three plants will produce sulphuric acid, ammonium sulphate and urea.

In addition, the company has been granted 'pioneer status' for the production of styrene monomer. This plant will involve an additional investment of $7.5 million and production is expected to total about 45 million lb. per year.

Oil Quality in Question At Gela

Construction of a petrochemical plant at Gela, Sicily, by A.N.I.C. (E.N.I. Group) is being conditioned by the local Sicilian Government's consent to reduce royalties on the oil produced locally because the quality of this oil is too poor. In fact a B.P.'s associate which found the same kind of oil at nearby Vittoria is said already to have given up its concession on the grounds of commercial worthlessness of the oil in question.

Recently the President of the Sicilian Assembly stated that revision of the royalties is currently being studied. The factory planned at Gela will produce large quantities of sulphur as a by-product, and the prospects of additional and cheap quantities of sulphur are said to be alarming the operators of the local sulphur mines which have experienced difficulty in marketing their output.

German Credit for Brazilian Oil Firm

German interests have granted credit amounting to DM.33,600,000, or some £2,800,000, to the semi-nationalised Brazilian oil company, Petróleo Brasiliero S.A. (Petrobras), for the equipping with West German plant of a synthetic rubber factory and the future buying of petrochemical and oil refinery equipment from Germany. The first purchases the company has in mind are of power plant for its planned synthetic rubber factory. Petrobras are at present building an oil refinery with a reported throughput of 4 million tonnes of crude oil annually, and it is to this plant that petrochemical works and installations for the production of oil-based manufactures will be attached.

S.B.A. Licence Processes for New Iranian Nitrogen Complex

A nitrogen fertiliser complex to be built at Shiraz, Iran, for the Iranian Government, will have as its general contractor the E.N.S.A. Company, France, who have entrusted general engineering of the project to Foster Wheeler Francaise. Soc. Belge del'Azote et des Produits Chimiques du Marly (S.B.A.), of Liege, Belgium, will handle design of the nitric acid and ammonium nitrate production plants.

At the same time, S.B.A. have granted the licence of their processes, already applied in several industrial plants with annual capacities of 800,00 tonnes of 100% nitric acid and 850,000 tonnes of ammonium nitrate at 20.5% of nitrogen. S.B.A. offer nitric acid processes for operation at either atmospheric pressure or under pressure and yielding an acid, the concentration of which can vary between 50 and 70% of HNO_3 in weight S.B.A. ammonium nitrate plants give a product with a nitrogen content ranging from 20 to 34.5%.

Methane-Chemical Plant at Adria

A group of private producers of methane and a German company have jointly set up a new company, Societá Methana, which will build a plant at Adria for chemical utilisation of methane.

All machinery and equipment will be supplied by the German firm, which will put up some 40% of the finance.

The new company will have an initial capital of 700 million lire (some £1,600,000) and construction will be started in January 1960. Initially, in 1961, the plant will produce only ethylene and acrylonitrile, but during the second or third year, the production of synthetic textile fibres will also be launched.

Aminotriazole in Canada

The Canadian health department's food and drug directorate will carry out immediate tests to determine whether use of the chemical weedkiller aminotriazole is dangerous. This follows a warning issued by welfare secretary, Arthur S. Flemming, in Washington that cranberries in parts of the U.S. may have been contaminated by the weedkiller.

The chemical is said to cause cancer of the thyroid in rats, and C. H. Jefferson, pesticide unit supervisor in the Canadian Department of Agriculture, said the chemical is authorised by Canada only for post-harvest application on cranberry bogs, preplanting application in cornfields, and application to the ground under fruit trees. He said also that as far as he is aware it leaves no residue, being broken down in the soil, and that it is less than 20% as toxic as DDT. (See also p. 810.)

New Process for Extraction of Zinc

RECOVERY of a higher percentage of zinc from ores than is obtained by standard methods, using a new process, is reported from Canada. The process has been discovered and tested extensively on a laboratory scale by Professor Frank A. Forward, head of the Department of Mining and Metallurgy at the University of British Columbia, during a research programme conducted by Sheritt Gordon Mines.

The process involves the direct leaching of zinc sulphides under oxidising conditions at low temperature and pressure to produce zinc sulphate solution and elemental sulphur. Recoveries of from 95% to 99% of the zinc are stated to have been obtained in extensive preliminary test work.

After separation of the solids, the zinc solution is amenable to conventional purification and is of a zinc concentration suitable for electrolysis with recycling spent electrolyte to the leading step. Sulphide sulphur is oxidised to elemental sulphur and can be recovered as such, if desired, as a marketable product.

Experimental work already conducted on the process has shown that high zinc recoveries can be expected. The presence of iron in the zinc sulphides has not been found to interfere with or complicate in any way the recovery of zinc as is the case with conventional roasting processes. Also as no combustion gases, sulphur dioxide or fumes are involved in the process, a zinc plant of this type could be located anywhere.

It is also reported that this process can be used for the extraction of zinc from simple zinc sulphides and complex lead-zinc and lead-zinc-copper sulphides.

Moranda Mines of Canada have made arrangements, it is understood, to use, if they so desire after completion of a laboratory and pilot-plant programme, this new process for treatment of zinc sulphides.

INDIAN NEWS LETTER

ASIA'S BIGGEST CAUSTIC SODA PLANT COMMISSIONED

NEW caustic soda plant—the biggest in Asia—with a production capacity of 30,000 tons a year, to be expanded later to 55,000 tons, set up by Dhrangadhara Chemical Works Ltd. at Sahupuram, Madras, was commissioned during October. With the operation of this plant the installed capacity for caustic soda in India has increased from 67,000 to 97,000 tons, representing a twentyfold increase in the capacity of the indigenous caustic soda industry over 1947. However, to meet the demands of the expanding consuming industries, such as soap, paper, textiles, rayon, aluminium and dyestuffs, and the petroleum refineries, India still imports considerable quantities of caustic soda. During 1958 the total production (57,000 tons) was less than 50% of the quantity consumed during the year—124,000 tons. By the end of 1960-61 the annual demand is expected to increase to 159,000 tons, when the installed capacity would be 135,400 tons.

The Dhrangadhara plant is the first in Asia having cells with amperage of the order of 60,000; 42 cells have already been installed and 30 more are being shortly added. The caustic soda produced is of rayon grade purity. This has been achieved partly by the use of brine and partly by special provisions made in the plant to avoid contamination at various stages.

Two By-Products

The two by-products—chlorine and hydrogen—are at present utilised for the production of hydrochloric acid gas which is used for the purification of the feed brine. Design, construction and initial operation of the plant has been done under the supervision of the French firm, Krebs and Co., Paris, while the concentration equipment has been supplied by the Swiss firm, Hch. Bertrams Ltd., Basle.

The project has involved a capital outlay of Rs.35 million (£2.62 million) and will effect an annual saving of Rs.15 million (£1.12 million) in foreign exchange.

Synthetic Rubber Plant. A synthetic rubber plant is soon to be established at Bareilly, in Utter Pradesh, with American technical and financial collaboration, at a cost of Rs.135 million (£10.12 million). The project, which is first of its kind in Asia, will have a rated capacity of 20,000 tons a year, to be expanded later to 30,000 tons.

The foreign exchange of Rs.75 million (£5.62 million), needed for the plant would be covered by Firestone Tyre and Rubber Co., Akron, Ohio, by loans from U.S. banks and by other investment houses in the U.K.

Present production of natural rubber in India is 24,348 tons; consumption of raw rubber in 1958 was 34,755 tons and imports 11,878 tons (raw rubber) and 3,523 tons (synthetic rubber).

Rubber Chemicals. The Alkali and Chemical Corporation of India, a subsidiary of Imperial Chemical Industries, is going to set up an organic chemicals plant at Rishra, near Calcutta at a cost of Rs.20 million (£1.5 million). The plant will produce a range of industrial organic chemicals including accelerators, anti-

- **£10 million synthetic rubber plant with U.S. aid.**
- **Sulphuric acid production at Bhilai, 12,000 tons/year.**
- **Synthetic rayon plant at Bombay.**
- **New plant to produce citric acid.**
- **Successful emulsifiers research at College of Pharmacy.**
- **Fluidised-bed technique for maleic anhydride.**

oxidants, retarders and other auxiliaries required by the rubber industry.

Annual capacity of the plant, 32,000 tons, will make the country self-sufficient in rubber chemicals for a considerable period, and will save the country Rs.10 million (£750,000) in foreign exchange. The plant is being designed and constructed in India largely by Indian technicians. Technical assistance and research information are being provided by the Dyestuffs Division of Imperial Chemical Industries.

New Sulphuric Acid Plant. Bhilai (Madhya Pradesh) where a million-ton steel plant has recently been set up with Russian assistance, is shortly going to have a plant to produce 12,000 tons of sulphuric acid yearly. The acid will be used for producing ammonium sulphate from the ammonia recovered as a by-product from the coke oven gases. The plant for the conversion of ammonia into ammonium sulphate is going to be commissioned within the next few months.

Viscose Rayon and Synthetic Fibres. The Indian Rayon Corporation Ltd. are shortly setting up a plant at Veraval (Bombay) for the production of viscose rayon yarn, synthetic fibres and ancillary chemicals. The Corporation has entered into agreement with the Von Kohorn Corporation for the supply of plant and machinery valued at Rs.4 million (£300,000) on deferred payment terms. The project will involve a capital investment of about Rs.33.2 million (£2.5 million), and licensed capacity of the factory is 10 tons of rayon filament per day.

Swedish Firm to Assist Manufacture of C.M.C. A Bombay firm, Cellulose Products of India Ltd., has been issued a licence for manufacture of sodium carboxymethyl cellulose (technical and pure) and chemical cotton. Technical collaboration will be available from Uddeholms Aktiebolag of Sweden. A plant with a capacity of 4 tons C.M.C., technical grade, per day is expected to be put up at first, then another plant for production of 1 ton per day of pure C.M.C. will be erected after one year. Manufacture of this item is expected to save considerable foreign exchange for the country.

New Plant to Manufacture Citric Acid. A new company styled Citric India Ltd., is proposed to be set up for the manufacture of citric acid. The plant, expected to be located at Dabhadi (Bombay), will manufacture the acid by fermentation of molasses. Total cost of the project is estimated at Rs.5 million (£375,000), and co-operation has been secured from a German firm for design, fabrication and erection of the plants. About 70% of the equipment is to be manufactured by the German firm in India itself.

Industrial Research

Tamarind Polyose. Tamarind polyose, extracted from tamarind seeds, has been found to have better emulsifying properties than acacia, tragacanth and starch. This is the finding of recent studies on the preparation of emulsions (for oral use) of cod liver oil, liquid paraffin, peanut oil, benzyl benzoate and turpentine conducted at the L.M. College of Pharmacy, Ahmedabad, Bombay State. Tamarind polyose extract is dissolved in boiling water and cooled to room temperature. To this solution the oil is gradually added and the suspension triturated until emulsification (with 50% oil) is complete. Ethyl *p*-hydroxy benzoate (0.15%) may be added to the emulsion as a preservative.

Carotene from Lichens. β-Carotene, well-known precursor of vitamin A, is used for colouring and enriching margarine, in pharmaceuticals, etc. A valuable raw material for carotene that has been a subject of recent study is the Indian lichen, *Roccella montagnei*, found commonly in South India on cashew nut, mango, pongamia, tamarind and banyan trees. The lichen has been reported to contain as much as 40 mg./100 g. of β-carotene and a small amount of γ-carotene.

A convenient method for the isolation of carotene from the lichen has been worked out at the Department of Pharmacy, Andhra University, Waltair. The method is simple and does not involve any prior drying of the material or saponification with alcoholic alkali to remove the non-carotenoid colouring matter, thus reducing the loss of carotene during processing.

Maleic Anhydride. The conventional method for the manufacture of maleic anhydride involves passing a mixture of benzene and air over suitably supported vanadium-molybdenum catalyst at 400°-450°C when a yield of about 60% is

obtained. An improved method has been developed at the Shri Ram Institute for Industrial Research, Dehli, using the fluidised bed technique and a moving bed reactor for the oxidation. The catalyst developed is capable of giving higher yields than those obtained by the conventional method. Economics of the process have been studied in a pilot plant producing 2 lb. maleic anhydride/hr. Yields of the order of 80-85% have been obtained, giving a conversion efficiency of about 90%. The catalyst retains its activity over a period of six months. Annual demand for maleic anhydride in India in the near future has been estimated at 1,000 tons; at present the requirements are being met from imports.

Pilot Plant for Vitamin B_6 Synthesis. The National Chemical Laboratory, Poona (Bombay), is going to set up a pilot plant for conducting studies on the synthesis of vitamin B_6 (pyridoxine hydrochloride) at an estimated cost of Rs.80,000 (£6,000). Capacity of the pilot plant will be about 0.25 kg. pyridoxine hydrochloride per batch, and necessary know-how has already been worked out on a laboratory scale. The process to be adopted involves ten steps, starting from chloracetic acid. At present, India imports her entire requirement (*ca.* 450 kg./year) of vitamin B_6 valued at Rs.700,000 (£175,000).

Research on Microbiological Production of Citric Acid at New Sturge Labs.

BASIC research on fermentation problems, particularly in connection with the microbiological production of citric acid, will be one of the main activities of the new organic and biochemical laboratories opened at Wheeleys Road, Birmingham, by John and E. Sturge Ltd. The new research laboratories are part of an overall plan to centralise the company's research work in a programme which is due for completion by the end of 1960 at a cost of more than £100,000.

Research work will involve a close study of the biochemical and chemical aspects of the life cycle of *Aspergillus niger* and the undertaking of an extensive mutation programme.

The well-equipped laboratories include an instrument room which is maintained at a constant temperature of 20°C, a special cold room for enzyme manipulation in which the temperature can be kept down to 0°C indefinitely, and sterile air-conditioned rooms to facilitate the handling of micro-organisms.

The existing physical chemistry research laboratories at Wheeleys Road have been modernised, and are now fully equipped for radiochemical and high vacuum work and for ultra-violet spectroscopy.

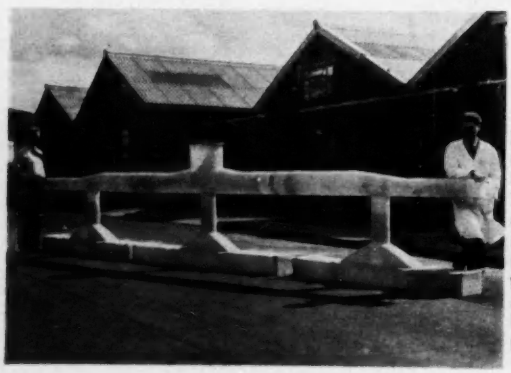
At the company's Lifford Chemical Works, Birmingham, the analytical laboratories are being extended to cope with the testing of increased production, and the development laboratories have been rehoused in larger premises and now include a section for technical service work on rubber, plastics, paper, paint and printing inks.

The Yorkshire laboratories at the company's Selby works, formerly devoted to the organic and biochemical research work, are now being used to extend the facilities of the development, analytical and microbiological departments. Construction will start shortly on a new fully equipped pilot plant that will be used for a number of products, with an associated laboratory and administrative offices.

Death in Chemical Firm Engaged on "Secret" Work

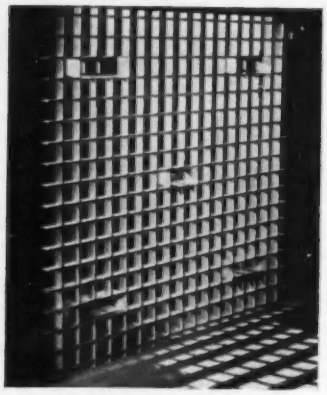
One man died in Crumpsall Hospital following an explosion at a chemical factory at Whitefield, Manchester, on 27 November, when five men were injured. Apparatus exploded in the chemical department of Theodore St. Just and Co. Ltd., who are employed on classified Government work. Chemicals in an overhead tank caught fire and debris came down from the roof. Cause of the fire is not yet known, but a full investigation is being carried out. Damage was not serious and production is being continued.

Resin-bonded Fibre-glass Ducting



Example of resin-bonded fibreglass ducting material by Thermo Plastics Ltd., of Dunstable, Beds, for the chemical industry, for which the firm have concentrated much of their production. Storage tanks and various components are also made by the company from materials such as rigid p.v.c. and Perspex

Cooling Tower Slats in High-density Polythene



Moulded by Ekco Plastics Ltd., these plastics grids for cooling towers measure some 3 ft. square and weigh only 4 lb.

MOULDED in high-density polythene, water tower cooling slats produced by Ekco Plastics Ltd., Southend-on-Sea, Essex, are expected to give a considerably longer life than the conventional wooden variety, are said to cut assembly time of the cooling tower, and to pack a greater cooling capacity into a given space.

Either high-density polythene or high-impact polystyrene can be used in the slats when the water to be cooled contains no hydrocarbons, and the mould used by Ekco, who are carrying out the fabrication on behalf of Fluor Products Co., U.S., and Head Wrightson Processes of the U.K., has been designed to cater for either material.

Mitchell Cotts and Congo Pyrethrum Industry

AGREEMENT is reported to have been reached in London between Mitchell Cotts Group and M. L. Hamburger for the erection of a new pyrethrum extraction plant at Goma in the Belgian Congo. A new company is to be formed in which both parties will be interested, to take over land already acquired and to erect and operate the new factory. Orders for the necessary plant and equipment are said to have been placed.

It is stated that Congo growers will be offered advantageous prices for their flowers through the A.P.L.Y. organisation which already exists as a planters' association.

Dumping of Pentaerythritol Eliminated, say B.o.T.

The Board of Trade announce that no further action will be taken for imposition of an anti-dumping duty on pentaerythritol imported from Canada, owing to the fact that the Canadian manufacturers concerned have eliminated the dumping which was involved. The application for such duty was being considered under the Customs Duties (Dumping and Subsidies) Act, 1957.

East Europe's Expanding Production of Chemicals

EXPANSION projects in hand at the Tarnobrzeg Sulphur Combine, Poland, will raise production of sulphuric acid to a figure of 100,000 tonnes next year. Further expansion will later raise capacity to 300,000 tonnes. A superphosphate plant now being built will have an annual capacity of 200,000 tonnes; sulphur will be exported to East European and other countries.

Other details of chemical industry expansion in Poland have been announced and include the erection of a nitrogen plant at Kedzierzyn. Ammonia output is to be raised from the present rate of 488 tonnes per day to 925 tonnes/day.

The nitrogen works at Tarnów are also to be extended and a new plant built for the processing of natural gas. Production of ammonia at Tarnów will be increased from the 1958 level of 275 tonnes/day to 900 tonnes/day in 1965. A p.v.c. plant under construction will have a future output of 25,000 tonnes/year. Acrylonitrile is scheduled for production at Tarnów with a 1956 output of 15,000 tonnes for the production of what is described as the "synthetic fibre Orlon".

Production of synthetic rubber has just started at Oswiecim and capacity is to be increased to 50,000 tonnes/year. It is also planned to produce some 25,000 tonnes of p.v.c. a year.

Czechoslovakia. Production of organic chemicals in Czechoslovakia is to be switched from a coal tar, brown coal, ethyl alcohol and carbide-acetylene basis to natural gas, coke oven gas, mineral oil and associated products. An important part of the 'coal-to-oil' conversion programme is the production of acetylene from natural gas and a major plant is to be erected at Duslo, where ethylene is obtained from cracking plant and coke-oven hydrocarbon gases, propylene and acetylene from natural gas.

Synthetic Rubber

Scheduled for production are synthetic ethyl alcohol, isopropyl alcohol, polythene, glycol, synthetic rubber, acetaldehyde, acetic acid, acetone and allied products. Production of synthetic phenol is to be raised substantially and phthalic anhydride output is scheduled for expansion so that by 1965 production will reach 1.25 k.g. per capita.

Official sources have stated that Czech production of most chemicals is scheduled for major expansion, although the percentage increases quoted are not related to base figures. The only figures quoted relate to chemical fertiliser capacity, at present said to represent 13 k.g. per head of population. Production of nitrogeneous and phosphatic fertilisers are to be raised to nearly 300,000 tonnes and 285,000 tonnes a year respectively. It is hoped to import 396,000 tons of potash from East Germany.

East Germany. Most production results in East Germany are said to have fallen below target levels, states that country's controlling organisation for the chemical industry, D.I.A. Chemie. It was stated to be vital that exports of polystyrene should be held steady in the period 1962-64, although it was believed that this might not be achieved.

Details of chemicals with ever-fluctuating export quantities such as phosphoric acid have not been released. It was, however, stated that if these fluctuations did not stop, overseas customers could not be gained or maintained. Improved qualities have been demanded for plastics materials, dyestuffs and pesticides.

New products scheduled include polythene and glass-fibre reinforced polyester. It is claimed that East Germany has the world's first plant to produce rock salt from the residues of potash production; this is at the Ernst Thaelman works, Merkas, where production is 500 tonnes per day. Similar processes are to be tested at other potash works.

A second carbide factory at Buna will, it is said, make this works the world's largest producer. Commercial production of Buna S-4-7, a low temperature synthetic rubber, now in the experimental stage, is scheduled at Buna in 1962.

Large-scale pilot plant for the production of synthetic fibre Lanon is being set up at Kunstfaserwerk, Premnitz. Operatives trained there will eventually go to the new Guben plant where Lanon output will be in the region of 9,000 tonnes/year.

Methyl Chloride

East Germany is stated to have supplied the U.S.S.R. with information regarding vacuum crystallisation plant, which has resulted in a saving of about 4 million roubles. The U.S.S.R. has successfully applied the East German experience in the production of methyl chloride and dimethylsulphate, which is resulting in a saving of about 7 million roubles.

Hungary. Work has begun on the erection of the Szolnok superphosphate plant in the Theiss area. Main stress-points of the chemical investment programme this year have been the building of a chemical combine at Tisza, the reconstruction of the nitrogen works at Pét and the extension of three pharmaceutical plants, Chinoin, Köbánya and the United pharmaceutical factory. Construction of a new p.v.c. plant is continuing at the Hungária Chemical Works and the Forte photochemical products plant at Vác is being rebuilt.

To increase plastics production, a 10,000 tonnes-a-year polythene plant is to be built. A 6,000 tonnes/year p.v.c. plant is under construction and it is planned to build a new p.v.c. unit with a 10,000 tonnes/year capacity. The fibre Danulon is being produced at the Danube-side plant of Nyergesujfalu, and it is stated that "preparations are being made for the manufacture in Hungary of Terylene."

Fertiliser production is to be increased to a level of 130 kg. per head of population, against the current level of 40 kg. To this end a new nitrogenous fertiliser factory is in hand at Tiszapalkony with an annual capacity of 82,000 tonnes and the plant at Kazincbaricka, completed 18 months ago, is to be doubled in size. Production of nitrogenous fertilisers during the third quarter of 1959 is put at 61,000 tonnes, or 137% higher than in 1958.

During May, June and July this year, production of sulphuric acid in Hungary (1958 figure in parenthesis) was: 11,769 tons (11,446), 12,193 tons (11,268), and 12,606 tons (11,299). The Board of Trade quotes these statistics in a report on Hungary.

Bulgaria. In January to September 1959, nitrate fertiliser production (metric tons) was 42,076 tons, 22% more than in the corresponding period of 1958; and that of phosphate fertiliser 20,216 tons (100%), calcinated soda 87,937 tons (12%), sulphuric acid 65,820 tons (49%), caustic soda 12,185 tons (10%)

Rumania. Figures issued in Vienna last week show that production of plastics and synthetic resins will total some 6,300 tonnes this year, against 2,000 tonnes in 1958. Synthetic fertiliser production is expected to rise from the 1958 total of 150,000 tonnes to 282,000 in 1959. By the end of the year, the first 1,000 tonnes of synthetic fibre should have been produced.

A construction programme involving eight new plants and 28 new installations in existing plants is in hand. Included in these projects are an ammonia plant at Roznov, Moldavia, a synthetic fibre works with an annual capacity of 5,000 tonnes at Sabinesti, Moldavia, and a large chemical complex at Borzesti, Moldavia, which is being built with Soviet assistance. At this third plant, waste refinery gases will be used as a base material for synthetic rubber, electrolytic soda and a range of plastics materials.

The other main project in the petrochemical field is to be a similar plant at Onesti, where synthetic rubber will be produced with other products. Operation is well under way at the natural gas-to-fertiliser plants such as the Victoria and Fogaras combines in Transylvania. A range of plants have been set up at Craiova, to utilise indigenous raw materials for the production of nitrogenous fertilisers, plastics, synthetic fibres, cellulose and cellulosic fibres.

Demineralisation Plant Contract Placed

A contract has been awarded to William Boby and Co. Ltd., Rickmansworth, Herts, by the Treforest Chemical Co. for a demineralisation plant for the purification of gelatine solution.

A further contract has also been placed with Boby's by the British Thomson-Houston Co. Ltd., Rugby, for the supply of a demineralisation water treatment plant for their works boilers.

Analytical Review

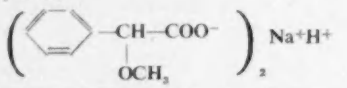
New Reagent for Precipitating Sodium from Aqueous Solution

By T. S. WEST, Ph.D.

Three recent papers are considered in this review; they are concerned with: (1) A new reagent for the precipitation of sodium from aqueous solution. (2) The titration of metals as bases in glacial acetic acid solution. (3) A method of differential thermogravimetry and some reflections on the interpretation of thermogravimetric data obtained by continuously recording thermobalances for the purposes of normal gravimetric analysis

THERE is a great need for a reagent to do for sodium analysis what the tetraphenylboron precipitant has done for potassium. The zinc or magnesium uranyl acetate reagents are of course available and function well when used correctly under as near ideal conditions as possible. A real need exists, however, for a reagent to precipitate sodium in amounts which are inconveniently large to be handled by the technique of flame spectrometry. It is of interest then to note a recent paper which describes a new reagent for the quantitative precipitation of sodium. This reagent —α-methoxyphenyl acetic acid is not in fact as satisfactory for sodium as tetraphenylboron is for potassium, but despite this it may find useful application in many quarters and perhaps more important still it may point the way to the evolution of a more successful reagent designed to incorporate the basic features of this molecule. (**1**)

α-Methoxyphenyl acetic acid forms a difficultly soluble sodium salt of composition



which has already been used as a reagent for the detection of sodium (**2**). Sodium is the only common element to form an insoluble *acid* salt which can be filtered off, dissolved, and then titrated with standard alkali(**3**). The fine structure of the sodium hydrogen di-(α-methoxyphenyl acetate) is not known, but its stability is almost certainly not due to hydrogen bonding and the reason for its existence is attributed to the molecules fitting closely together to build up a crystal lattice. The compound is best precipitated at an initial temperature of 25 to 30°C and 97% of the sodium has been brought down within two hours standing at 0°C.

In the recommended method the 'total' sodium is obtained by applying a correction factor to compensate for unprecipitated sodium. The correction factor appears to be remarkably constant. The precipitation medium must contain at least a 50% excess of reagent and an additional amount if a heavy metal or alkaline earth metal is present since there appears to be a reaction which prevents precipitation of sodium. The precipitate is allowed to stand overnight at 0 to 2°C, filtered, washed with acetone dissolved in *hot* water and titrated with standard 0.05M sodium hydroxide to a phenolphthalein end-point.

Results obtained with two preparations of the reagent over a period of a year indicate that for pure solution work the method is as accurate as the standard zinc uranyl acetate procedure. In the presence of a four-fold amount of potassium (relative to sodium) the reagent is said to be superior. Moreover, there is no need to remove lithium as in uranyl acetate procedures since it does not react with this reagent. Several heavy metals form precipitates with the reagent, but none is an *acid* salt and cannot therefore be titrated.

Inorganic Titrimetry in Glacial Acetic Acid. In glacial acetic acid a metal acetate is dissociated to a greater or lesser extent depending on the acidity of the metal ion.

$$MAc_n \rightleftharpoons M^{n+} + nAc^-$$

The strength of a base, BOH, in water may be visualised similarly. Just as the OH^- is a strong base in H_2O so the Ac^- ion is a strong base in HAc. Consequently the acetate ions furnished by dissociation of the metal acetate can be titrated with $HClO_4$ with the elimination of an uncharged solvent molecule

$$Ac^- + H^+ClO_4^- \rightleftharpoons HAc + ClO_4^-$$

just as hydroxide ion is titrated to form water and the conjugate base ion (ClO_4^-) from the acid. Acetates of the first and second group metals act as strong bases and give sharp, well defined pH curves, These metals which are considered as weak bases in water behave similarly in this medium (with a few exceptions) and show less well defined pH curves. One exception is ammonium acetate which is as strong as potassium acetate.

Casey and Storke (**4**) have now described the potentiometric titration of 18 metal acetates in this manner. Most metals behaved more or less as expected, but antimony, bismuth, copper, tin and uranium showed no titration curve at all. Aluminium and iron (III) which were expected to behave normally, gave only 10% recoveries in spite of well defined and reproducible titration curves. This low recovery was attributed to the formation of a complex ion.

$$[M_3(OH)_2(Ac^-)_6]\ Ac^-$$

the like of which has previously been reported in the literature (**5**). This fits in with the observed recovery and is backed up by the stoichiometry of the reaction at different concentrations which indicates titration to a definite formula.

The electrode assembly consisted of a glass—aqueous calomel system except in the titration of lead or silver when a lithium acetate salt bridge was used to separate off the calomel cell or alternatively a silver-silver chloride reference cell was used. Crystal Violet was also used as indicator, but the multiplicity of end-point colour shades proved troublesome. The following metals titrated well potentiometrically or visually Na, K, Li, NH_4^+, Sr, Ba, while the following could be titrated potentiometrically only—Mg, Ca, Mn and Cd. Ni and Co titrated not too well with $HClO_4$ in dioxan and not at all with acetous $HClO_4$. Zn and Ag were determined by a back titration process since they were themselves insoluble. Chloroacetates were also titrated satisfactorily (Na, K, Ba, Mg), but ammonium chloroacetate appeared to undergo decomposition to glycine.

Derivative Thermogravimetry. For users of the technique of thermogravimetric analysis has recently been published (**6**). A simple differentiator is built consisting of a battery-operated precision transmitting potentiometer linked to the balancing slide wire of the recorder normally used for the conventional thermogram. The generated signal from the potentiometer is differentiated (by a resistance capacity circuit) and recorded against another times base. This instrumentation essentially produces sharply defined peaks which pinpoint the regions where sharp changes occur. In many instances, however, it appears to me that this type of presentation of results defeats its own purpose since the flat portions of the curve (in which many workers are interested by say a slight gradual rise or fall) are blanketed out by this technique.

It might also be appropriate here to air an opinion shared by many analysts that the result obtained by thermogravimetry for the optimum drying temperatures of gravimetric precipitates and primary standards may in some cases be misleading. This is so because the thermobalance curves are obtained against a steadily rising temperature base-line, whereas in practice the analyst will almost certainly place a precipitate at room temperature in an oven set at the appropriate temperature *for at least one hour* or more. Such equilibration time is unlikely to be attained by thermogravimetry. It is suggested that all thermogravimetry data should be recorded in terms of the temperature gradient (against time) and that any conclusion drawn from them should be most carefully considered before recommendations are made for normal gravimetric practice.

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New Developments in Packaging Materials

A NEW type of packaging material, called cross-creped kraft, is stretchable in both diagonal directions, retains its elongation, can be slit, die-cut, moulded and glued. Manufactured from kraft paper in basis weights ranging from 40-90 lb. it can be impregnated with wet-strength resins, waterproofing agents, fungicides or flameproofing materials.

It is listed as Abstract 2543 in the current issue of *Packaging Abstracts*, published by the Printing, Packaging and Allied Trades Research Association.

Other new developments include German-made bitumen-coated sack papers, additionally coated with polythene to give greater strength against the strains of folding and creasing (Abstract 2537) and three types of vinyl sheeting claimed to have higher impact strength, greater light stability and greater resistance to heat distortion than materials previously available (Abstract 2560).

Reference is also made to a container made from non-plasticised rigid p.v.c. film with a non-toxic stabiliser which takes liquid products (Abstract 2665), the use of organic silicone compounds (polyethylsiloxane) in the manufacture of paper and board (Abstract 2544) and the corrosion-inhibiting impregnating agents employed in making VPI papers —amine salts of carboxylic acids, such as cyclohexylamine laurate (Abstract 2585).

C.S. and R.I.C. to Hold Joint A.G.M.s in Belfast

The Chemical Society and the Royal Institute of Chemistry are to repeat an experiment made seven years ago when they held their annual meetings jointly for the first time. Arrangements have been made for the joint meetings to be held in Belfast on 5 to 8 April 1960.

Obituary

Dr. Walter J. Murphy, editorial director of the applied journals of the American Chemical Society, died in Washington on 26 November. After obtaining a B.S. in Chemistry at Brooklyn Polytechnic in 1921 he held a number of industrial appointments before entering the editorial field in 1930. In 1939 he was made editor and general manager of *Chemical Industries* and in 1942 assumed the post of A.C.S. editor and became director of the society's news service. After the war, he investigated war-time developments in the German chemical industry on a Joint Chiefs of Staff mission. A technical representative at the Bikini atom bomb test and a member of the Atomic Energy Commission's Advisory Committee on Technological Information, he was also a consultant to the Army Chemical Corps.

Mr. Dennis Sleath, Midlands area manager of Borax Consolidated Ltd., died on Saturday, 28 November. He had been with the firm since 1936.

Woodward Awarded Davy Medal for Work on Drug Structures

AWARD of the medals for 1959 by the Royal Society was made at the anniversary meeting on 30 November. President, Sir Cyril Hinshelwood, after distributing the medals addressed the gathering on 'The internal and external worlds'.

This year the Copley Medal has been awarded to Sir Macfarlane Burnet, one of the outstanding workers in the field of viruses, who has contributed so much to the knowledge of bacteriophages and has elucidated the phenomenon of lysogenesis. Professor R. E. Peierls has been given a Royal A Medal. Professor Peierls is a leading authority on the solid state. Recently he has devoted attention to the general theory of quantal fields and of elementary particles.

For research on the biology of senescence Professor P. B. Medawar has been awarded a Royal B Medal. Fundamental analysis of the problems of tissue inheritance and differentiation followed Medawar's main work on tissue grafting. He showed that a graft from one individual to another will not in general survive (except with identical twins). Recently, Medawar and his co-workers have discovered ways of disintegrating cells ultrasomically without destroying their antigenic power. By fractionation it was shown that this powder resides in the nucleus and not the cytoplasm and that probably compounds of deoxyribonucleic acid and proteins are responsible. These discoveries are regarded as offering great possibilities for further study of the action of nuclear derivatives.

By general consent considered among the leading organic chemists of the world today, Professor R. B. Woodward has been awarded the Davy Medal. He has made major contributions to the elucidation of the structures of cantharidine (1941), penicillin (1945), strychnine (1947), sempervirine (1949), santonic acid (1949), palutin (1949), terramycin and aureomycin (1952), cevine (1954), magnamycin (1956), rauvomitine (1956) and gliotoxin (1958).

In the field of organic synthesis, Professor Woodward has worked on morphine (1951) and has synthesised many other important natural products including quinine, sempervirine, palutin, chlosterol and cortisone (1951) strychnine, lysergic acid (1954), lanosterol (1954) and reserpine (1956). The scope of his work is demonstrated by his work on the aromaticity of ferrocene (1952), on reaction mechanisms especially of the Diels-Alder additions, and his contributions to the understanding of the theory of optical rotatory dispersion.

For outstanding contributions to low-temperature physics, the Hughes Medal was awarded to Dr. A. B. Pippard. In recent work Pippard has carried out detailed measurements at high frequencies on the surface-resistivity of single metal-cystals, analysing the variations which occur in different directions related to the crystal axes. He has shown how such measurements can be used to plot a contour of the way in which the positions of the valence electrons of highest energy are woven into the crystal-lattice structure.

SO_2 Siphon Safety Device by I.C.I.

A RECENT change in the way liquefied sulphur dioxide siphons are supplied has led I.C.I. to develop a new safety device whereby the siphon is housed in a cylindrical cardboard container fitted with a metal top and bottom, and filled with sawdust. The container gives a measure of protection and is not meant to be removed.



The safety guard developed by the I.C.I. Akers Research Laboratory for protecting sulphur dioxide siphons

The guard, devised by Akers Research Laboratories of I.C.I. Ltd., at Welwyn, Herts, gives a desirable extra degree of protection for such siphons. Even if the siphon container is damaged or softened by careless treatment it can still be placed inside the 12 in. high guard, which acts as a convenient means of carrying the siphon. Made from 20-gauge perforated, mild-steel sheet, 16-gauge mild-steel sheet and ¼ in. mild-steel rod, the inside of the guard base is covered with ¼ in. rubber sheet.

New Plastics Laboratory for Shell Chemical

Shell Chemical Co. Ltd. plan to establish a plastics laboratory at their Carrington Works, near Manchester, to support the manufacture and marketing of polystyrene and high density polythene and future polypropylene and low density polythene production.

Big E-Mil Sales Increase

Home sales of E-Mil laboratory ware have been 30.9% above the record 1958 sales period, while exports have risen by 45.4%, state the manufacturers, H. J. Elliott Ltd., E-Mil Works, Treforest, Glam.

PEOPLE in the news

● At the recent anniversary meeting of the Royal Society **Sir Cyril Hinshelwood,** Dr. Lee's professor of chemistry at Oxford University, was re-elected president. The other officers re-elected were: treasurer, **Sir William Penney, K.B.E.,** member for scientific research, Atomic Energy Authority; biological secretary, **Sir Lindor Brown, C.B.E.,** Jodrell professor of physiology at University College London; physical secretary, **Sir William Hodge,** Lowndean professor of astronomy and geometry in the University of Cambridge; and foreign secretary, **Dr. H. G. Thornton,** lately head of the department of soil microbiology at Rothamsted Experimental Station.

Other members of Council elected included: **Professor D. G. Catcheside,** professor of microbiology, Birmingham University; **Professor A. L. Hodgkin,** R.S. research professor; **Sir Patrick Linstead, C.B.E.,** rector of the Imperial College; **Professor R. A. Morton,** Johnston professor of biochemistry, Liverpool University; and **Dr. H. W. Thompson, C.B.E.,** university reader in infra-red spectroscopy, Oxford.

● **Mr. A. J. Turnbull, F.R.I.C.,** who is attached to the regional laboratory of the Nestlé Co. Ltd. at their head office, St. Georges House, Wood Street, London E.C.2, is the new vice-chairman of the London Section, Royal Institute of Chemistry. He was hon. assistant secretary from 1952 to 1955, hon. secretary from 1955 to 1957 and served on the committee from 1957 to 1959. The Nestlé regional laboratory is responsible for analytical control of the U.K. manufacture of all the company's products, except chocolate and confectionery, which are controlled from Hayes. Before joining the company in March 1958, Mr. Turnbull was chief chemist for Idris Ltd.



A. J. Turnbull



J. Hartley

● **Mr. J. Hartley** has been appointed manager of the new plastics laboratory which Shell Chemical Co. Ltd. expect to complete in 1961 at their Carrington works. After graduating from Liverpool University in 1943, Mr. Hartley joined Shell's Thornton research centre in Cheshire, and in 1957 he was appointed assistant manager of Carrington research laboratory, where much of Shell's development of l. p. polyolefin processes has been carried out.

● **Mr. W. Tudor Davies, J.P., B.A.,** has been appointed to the board of M. A. Phillips and Associates Ltd., consulting chemists and chartered chemical engineers, 9 Western Road, Romford, Essex.

● **Dr. P. W. Cunliffe** has been appointed to the board of directors of the British Cotton and Wool Dyers' Association Ltd. He was one of the original staff of the British Cotton Industry Research Association, and was awarded the gold medal of the Society of Dyers and Colourists in 1950 and a bar to the gold medal in 1955. He has also received the medal of the Textile Institute in recognition of distinguished service to the textile industry.



P. W. Cunliffe



E. E. Griesser

● **Mr. E. E. Griesser** has been appointed manager of the Union Carbide Technical Service Laboratory, to be located in Geneva, Switzerland. The new laboratory will be under the supervision of Union Carbide Europa S.A. which is located in Geneva and is an affiliate of Union Carbide Corporation. Mr. Griesser is experienced with all phases of plastics processing and while with Union Carbide maintained an association with the European plastics processing industry through extensive travel in that area. The laboratory will be devoted primarily to rendering technical service to the European plastics industry. It will develop and demonstrate technical know-how, cultivating new end uses for polythene and other plastics within the European market.

● **Mr. F. J. Slee** has retired from his post as joint lubricants manager of Shell-Mex and B.P. Ltd. after 36 years' service. **Mr. L. H. Coney,** who joined Mr. Slee as joint manager in 1954, is now manager of the department.

● **Dr. P. B. D. de la Mare,** reader in chemistry at University College, London, has been appointed to the University Chair of Chemistry at Bedford College.

● **Mr. Derrick Kleeman,** chairman of Erinoid Ltd., West Halkin House, West Halkin Street, London S.W.1, has now also been appointed managing director of the company following the recent untimely death of Mr. John Harvey. **Mr. Harry Kleeman** joins the board as director in charge of polythene sales, and will also be responsible for Kleeman Group public relations and advertising. **Mr. L. A. Hygate** has been appointed to the board as director and general manager at the Stroud factory.

● **Mr. M. J. Antcliff,** personnel director of Albright and Wilson (Mfg.) Ltd., sailed from Liverpool on 1 December bound for Melbourne, where he will represent the firm at the 12th International Congress of Scientific Management, organised by the Australian Institute of Management. The congress will be held at Sydney from 23 to 26 February, continuing at Melbourne from 29 February to 4 March.

● **Mr. L. H. Williams,** managing director, Shell Chemical Co. Ltd., will deliver the 5th Ivan Levinstein Memorial Lecture under the title 'The future of chemicals from peetroleum'. The lecture will be delivered on 5 February 1960 in Manchester. Further details will be announced later.



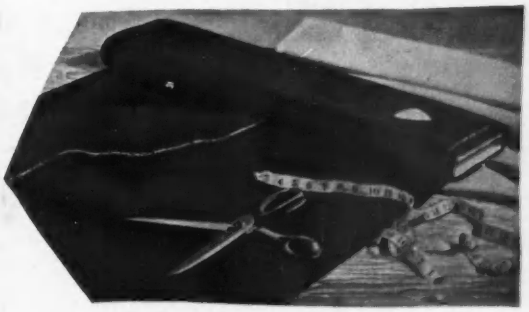
Dr. E. M. Hunt, whose resignation from Shell Chemical Co. Ltd. to join the board of Utilex Ltd. took effect on 30 November. (See 'Chemical Age,' 28 November, p. 778)

● **Mr. D. J. Grant** has been appointed chairman of the reconstituted board of the Chemical Insulating Co. Ltd., Darlington, Co. Durham, in which the other newly elected officers are: **Mr. F. R. Gibson,** managing director; **Mr. G. Banks, Mr. K. C. Plumbe** and **Mr. F. Sawdon.**

● **Dr. N. F. Astbury** has been appointed director of research of the British Ceramic Research Association to succeed **Dr. A. T. Green,** who is to retire on 31 December.

● **Professor E. G. Cox, T.D., D.Sc., F.Inst.P., F.R.I.C., F.R.S.,** professor of inorganic and structural chemistry, Leeds University, is to succeed **Sir William Slater, K.B.E., D.Sc., F.R.I.C., F.R.S.,** as secretary of the Agricultural Research Council on Sir William's retirement next year. Professor Cox's appointment will take effect from 1 July 1960.









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Commercial News

- **Wm. Butler's Half-year Profit Up £17,000**
- **Delays at Fisons' Ammonium Nitrate Plant**
- **Sasol Plan Production of New Chemicals**
- **Lancashire Tar Distillers Raise Capital**

British Benzol

A dividend of 10% for year ended 3 October 1959 (interim 5% and final 5%) is reported for British Benzol and Coal Distillation Ltd. Net profit is £13,962 (loss £28,967), after tax of £4,064 (credit £2,069). British Benzol are now controlled by Henry Briggs, Son and Co. (Trust).

Wm. Butler

Group income of Wm. Butler and Co. (Bristol), before tax, for the half-year ended 30 June 1959, totalled £88,348 (year 1958 £80,806). For minority interests before tax the sum of £16,676 (£34,194) has been deducted and the loss on sale of plant was £7,700, leaving profits attributable to the parent of £63,972 (£46,612).

In his interim statement, chairman, Mr. Eric W. Butler, states that he has no reason to suppose that group trading results during the current half-year will be materially different from those during the first half.

Fisons Ltd.

Sir Clavering Fison, chairman of Fisons, said last week that he saw no reason to modify his confidence in the trading outlook, both in fertilisers and chemicals. Referring to the company's new ammonium nitrate plant at Stamford-le-Hope which had not been running to capacity due to delays in raw material supplies, Sir Clavering said that the position was now much better.

Gas Purification

Gas Purification and Chemical's unaudited net profit, before tax, for the first four months of the current year was £305,000. Profits were higher in the following four weeks and the carryover deficit on the balance sheet was entirely wiped out, and a loan of £100,000 repaid. An interim dividend in January will be declared in respect of the current year.

O. and M. Kleemann

O. and M. Kleemann have sold their subsidiary company Kleeware Plastics to Rosedale Associated Manufactures as part of a plan to concentrate on their raw material interests and to withdraw from the plastics consumer goods field. O. and M. Kleemann's turnover and profits for the first nine months of the current year have been running at a considerably higher rate than in the same period of 1958, and the directors look forward to satisfactory trading results for 1959.

McKechnie Brothers

As the current financial year has opened favourably for the McKechnie Brothers group, chairman, Mr. J. D. McKechnie, anticipates improved results, subject to there being no sudden change in trading conditions.

Widnes works contribution to profits has been seriously affected by poor prices for sulphate of copper during the past two years, but the company hope that steps taken will improve the position in due course.

Group net profits expanded from £246,607 to £617,051 in 1958-59 and in addition to maintaining the 15% tax free dividend, there is a special 5% tax free distribution out of non-taxable profits.

Johnson Matthey

Johnson Matthey and Co., gold, silver and platinum refiners in whom Consolidated Gold Fields of South Africa have an interest, are raising the interim dividend from the equivalent of 2 to 3% on a capital increased by a one-for-two scrip issue on account of the year ending 31 March 1960. The equivalent total for 1958-59 was 8%.

Sasol

South African Coal, Oil and Gas Corporation (Sasol) made their first cash surplus of £938,000 during the year ended 30 June 1959, reported Dr. F. J. du Toit, chairman. Depreciation of £1.3 million turned this into a loss of £378,000 which was added to capital accounts, now involving about £47 million. Sales rose from £4.8 million to £6.7 million and are expected to reach £7.5 million in the current year.

Of £2.2 million chemicals sold last year, more than £500,000 was exported. Several synthesis plants will come into operation during 1960 or 1961.

Negotiations are in progress about making propylene, ethylene, methane and hydrogen for further processing and perhaps also carbolic acid, cresylic acid and higher tar acids. Jointly with National Chemical Products, Sasol recently formed Kelchem Proprietary for the manufacture of oxygenated organic chemicals.

I.C.I.A.N.Z.

Ordinary dividend of Imperial Chemical Industries of Australia and New Zealand has been raised from 9 to 10% with a final of 6½%.

Following record sales of £A61 million the parent's profit for the year to 30 September last, rose from £A2,720,000 to £A2,837,000. Tax took £A540,000 and depreciation £A1,247,000.

Reichhold Chemicals Inc.

Sales by Reichhold Chemicals Incorporated, Zurich, for the first nine months of 1959 were 31% above the figure for the same period of a year earlier—$71,147,000 compared with $54,434,000 (1958). The figures, though high, have fallen somewhat below the firm's expectations owing to a strike at one plant, to loss of the Austin, Texas, plant in a tornado, and to expenses involved in the $24 million expansion programme.

INCREASES OF CAPITAL

LANCASHIRE TAR DISTILLERS LTD., Chronicle Buildings, 74 Corporation Street, Manchester. Increased by £300,000 beyond the registered capital of £700,000.

THOMAS HEDLEY AND CO. LTD., Phoenix Buildings, Collingwood Street, Newcastle upon Tyne. Increased by £2,000,000, beyond the registered capital of £1,560,000.

Market Reports

SATISFACTORY VOLUME OF NEW BUSINESS

LONDON Home demand for chemicals and allied materials has been well sustained with the chief industrial outlets calling for good quantities against contracts. The volume of strictly new business has been satisfactory, and an increasing interest has been shown in forward bookings. Prices generally are unchanged but with the supply position reasonably good quotations are competitive. A further decline in the price of copper sulphate has been notified, the current price being £76 15s per ton, less 2% f.o.b. Liverpool.

Export trade continues on a steady scale. Activity in the fertliiser market has been seasonally quiet, but there is a strong demand for basic slag. Among the coal tar products creosote oil and cresylic acid are in steady request on home account.

MANCHESTER The past week has seen little change of any consequence in the general price position of chemicals on the Manchester market. On the home side a reasonably steady demand has been experienced during the past week for the soda and potash compounds, and there has been a fair call for most of the non-ferrous metal products, and miscellaneous chemicals. A ready outlet continues for hydrogen peroxide. The shipping movement continues at a satisfactory level. In the tar products section, carbolic and cresylic acids and creosote oil are a steady trade.

SCOTLAND Another week of brisk activity is reported from the Scottish market, and demands have again been varied, with quantities well maintained for spot and contract requirements.

Numerous enquiries have also been received, together with those relating to contract requirements for next year. On the whole prices have been fairly steady. The export market is still showing considerable interest with a steady flow of enquiries and a reasonable volume of resultant business.



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TRADE NOTES

Industrial Space Heating

Dravo industrial space heaters, formerly marketed under licence in the U.K. by Weatherfoil Ltd., are now being distributed by a new company, Powell Duffryn Modulair Ltd., Powell Duffryn House, Berkeley Street, London W.1. This company is also taking over from Weatherfoil the marketing of Tuttle and Bailey air distribution equipment.

New Entries in BDH Catalogue

The following organic and inorganic chemicals have been added to the catalogue of the British Drug Houses Ltd., Laboratory Chemicals Division, Poole, Dorset: N-Chloro-succinimide *p*-hydroxy-acetophenone; malonitrile; Papanicolaou's stains and ion-exchange resins. The amendment is dated November, 1959.

Diffusion and Penetration Products

Diffusion and penetration agents for pharmaceuticals manufactured by Gattefosse s.f.p.a., of Lyon, France, are shortly to be placed on the home market by Jacobson Van Den Berg and Co. Ltd. A booklet describing these products is obtainable from the importer, at 3/5 Crutched Friars, London E.C.3. The firm is also supplying a range of human placenta and bovine embryo extracts manufactured by the same French company.

Incandescent Group

An area office has been opened by the Incandescent Group of companies, at 40, Newport Road, Cardiff, under the management of Mr. J. W. Payne. The group includes the Incandescent Heat Co. Ltd., Metalectric Furnaces Ltd., Controlled Heat and Air Ltd., and Selas Gas and Engineering Ltd.

Stone-Platt Subsidiary

Formation of Carlyle Air Conditioning and Refrigeration Ltd., 1 King Street, St. James's, London S.W.1, is announced in a colour-printed folder describing the work of the new firm and of their parent companies, Stone-Platt Industries Ltd., of the U.K., and the Carrier Corporation, U.S.

Change of Name

G. T. W. Newsholme Ltd., pharmaceutical and manufacturing chemists, 27 High Street, Sheffield, have changed their name to Newsholme Ltd.

J. W. Towers and Labacta

A brochure entitled 'Labacta' describing the nutritive properties of the substance and its uses in the culture of pathogenic micro-organisms is available from J. W. Towers and Co. Ltd., Victoria House, Widnes, Lancs. The material is offered both as a ready-to-use blood agar base and as a nutrient broth.

Bakelite Epoxide Resins

A new brochure entitled 'Bakelite epoxide resins and their applications' is available which outlines some of the uses of epoxide system marketed by Bakelite, whose address is 12-18 Grosvenor Gardens, London S.W.1. The brochure is intended for use in conjunction with the large number of advance information sheets and technical memoranda already issued on specific applications of the systems.

Handling Factory Moved

Owing to increased demand, G. Hunter (London) Ltd., 80 Fenchurch Street, London E.C.3, have closed their factory in South Benfleet and moved to Grays, Essex, where 15,000 sq. ft. of factory space have been completed and nearly an acre is concreted ready for additional buildings. It is intended to centralise as much of the manufacturing capacity as possible at Grays to include eventually the complete range of products. Present production is of adjustable loading ramps, cranes, stackers and fork trucks.

Shell Price Reductions

Shell Chemical Co. Ltd. will reduce prices of the following chemicals by up to £9 per ton: methyl ethyl ketone, methyl isobutyl ketone, secondary butyl alcohol, methyl isobutyl carbinol. The new prices took effect on 1 December.

B.D.H. and Sensi-discs

By arrangement with Becton, Dickinson and Co. the B.D.H. Laboratory Chemicals Division have undertaken the U.K. distribution of the dried culture media, Sensi-discs, for sensitivity testing, and Sensi-disc dispenser produced by the Baltimore Biological Laboratory.

Factice in Neoprene

A new technical bulletin (146/R/59) entitled 'Factice in Neoprene Compounding' has been issued by the Anchor Chemical Co. Ltd., Manchester 11. Data given on 854, 819A, 1X, and NBF2 dark factice includes recommended uses, test results, properties and a selector diagram showing the varying circumstances for which the grades are recommended.

New Impalco Brochure

A colour brochure describing and illustrating the varied uses of extruded and drawn aluminium is available from Impalco (Imperial Aluminium Co. Ltd.), a subsidiary of Imperial Chemical Industries Ltd. Address of the firm is P.O. Box 216, Witton, Birmingham 6.

Change of Title

To clarify the association with the parent company, the Morgan Crucible Co. Ltd., Battersea, the name of Synthetic Carbon and Engineering Co. Ltd. has been changed to Morgan Components Ltd. The firm's capacity at Stanmore has been enlarged and will be concentrated on sales and production of all brush holders hitherto manufactured by Morgan Crucible and Synthetic Carbon and Engineering Co. Ltd., and it is planned to add to the range of brush holders now offered, which will be marketed under the trade name "Morganite."

Safety Week

Organised by the British Safety Council, 40 Westbourne Grove, London W.2, Safety Week is scheduled for the first week of February, 1960.

DIARY DATES

MONDAY 7 DECEMBER

C.S.—Cambridge: University Chemical Laboratory Lensfield Rd., 5 p.m. 'Fluorescence of organic vapours' by Dr. B. Stevens.

S.C.I. with O.C.C.A.—Hull: Royal Station Hotel, 7.15 p.m. 'Some new reactions of fatty acids and their influence on paints and varnishes' by J. Weiss.

TUESDAY 8 DECEMBER

C.S. with R.S. and S.C.I.—Edinburgh: North British Station Hotel, 7.30 p.m. 'Biosynthesis of porphyrins', by Prof. A. W. Johnson.

I.Chem.E.—Manchester: Chemical Engineering Buildings, Jackson St., 6.30 p.m. 'Chemical engineering problems in hydrogen peroxide production', by W. R. Holmes.

S.C.I.—Birmingham: Birmingham and Midlands Inst., 6.30 p.m. 'An assessment of the acceptability of chemical additives used in food technology, by Prof. A. C. Frazer.

S.C.I.—London: 14 Belgrave Sq., S.W.1. 10.30 a.m. Meeting on 'Long-term horticultural experiments'.

S.C.I.—London: 14 Belgrave Sq., S.W.1., 6 p.m. 'Rocket propulsion', by J. E. P. Dunning.

WEDNESDAY 9 DECEMBER

O.C.C.A.—London: Manson House, 26 Portland St., W.1., 7 p.m. 'Electron microscopy and paint technology' by Dr. S. H. Bell.

Plastics Inst.—Newport: Queen's Hotel, 7 p.m. 'Molecular structure and properties of plastics and rubbers' by Dr. A. W. Birley.

S.A.C.—London: Burlington House, W.1., 7 p.m. Annual meeting of biological methods group. 'Biological methods in forensic science' by Dr. H. J. Walls, S. S. Kind, and Dr. A. S. Curry.

S.A.C.—Wolverhampton: Wolverhampton and Staffs. College of Technology, 7 p.m. Discussion on 'Determination of trace impurities in metals'.

THURSDAY 10 DECEMBER

C.S.—London: Burlington House, W.1., 7.30 p.m. Centenary lecture, 'Some recent advances in fluorocarbon chemistry' by Prof. G. H. Cady.

R.I.C.—London: Northampton College of Advanced Tech., St. John St., E.C.1., 6.30 p.m. 'Nuclear magnetic resonance' by R. E. Richards.

FRIDAY 11 DECEMBER

Inst. Physics.—Cardiff: University College, 6.15 p.m. 'Nuclear magnetic resonance in liquids' by Dr. J. A. Pole.

O.C.C.A.—Manchester: Textile Inst., 10 Blackfriars St., 6.30 p.m. 'Work study and industrial productivity', by A. G. Rees.

R.I.C.—Maidstone: The Old Palace, 7 p.m. 'Some aspects of the photographic reproduction of colour' by H. Baines.

B.o.T. Index Shows Little Change in Chemical Prices

PRICES in the U.K. chemicals and allied industries were slightly higher in October than the previous month, according to the Board of Trade's wholesale price index. Based on a 1954 index of 100, the following extract is in monthly averages:

	Oct. 1958	Sept. 1959	Oct. 1959
Chemicals & allied industries:			
Total sales	104.0	105.4*	105.5*
Home market sales ...	105.2	106.4	106.6*
General chemicals ...	107.3	106.4	106.4*
Pharmaceutical chemicals	82.1	82.1	81.8*
Synthetic resins & plastic materials	91.7	90.0	90.0*
Pyrites, c.i.f. U.K. ports	74.1	64.2	64.9
Sulphur, crude (for acid making), c.i.f. ...	80.0	77.4	77.4

* Provisional figure.

Detection of Sulphur Dioxide

H.M.S.O. has published for the Ministry of Supply a reprint of "Methods for the Detection of Toxic Substances in Air, Booklet No. 3—Sulphur dioxide," (including Chart of Stains), price 4s 6d (by post 4s 8d).

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period

ACCEPTANCES

Open to public inspection 20 January

Electrolytic process for preparing titanium metal. Spence & Sons Ltd., P. **826 667**

Process for manufacturing basic carboxamides. Crookes Laboratories Ltd. **826 668**

Apparatus for cooling liquids in bulk. Gascoignes (Reading) Ltd. [Cognate application 406.] **826 734**

Porous media. Ontario Research Foundation. **826 740**

Production of calcium substitution products of cyclopentadiene and also of alkylated benzylated and arylated cyclopentadienes. Zeigler, K. **826 741**

High molecular weight polymers of acetylenic hydrocarbons and process for preparing them. Montecatini Soc. **826 674**

Bituminous bonding agents. Carlisle Chemical Works Inc. **826 745**

Epoxy-ether resin compositions. Minneapolis-Honeywell Regulator Co. **826 746**

Polyesters. Goodrich Co., B. F. **826 675**

Polyethylene moulding process. Farbwerke Hoecht AG. **826 748**

Therapeutic compositions. Pfizer & Co. Inc., C. **826 676**

Antibiotics. Laboratoires Francaise de Chimiotherapie. **826 756**

Production of oxygenated hydrocarbon. Imperial Chemical Industries Ltd. **826 763**

Phthalocyanine dyestuffs. Imperial Chemical Industries Ltd. [Cognate application 13 846.] **826 689**

Process of coagulating aqueous dispersions of finely divided solids, and coagulants for use in such process. National Aluminate Corp. **826 770**

Waste heat recovery apparatus for steam boiler plants. Svenska Rotor Maskiner AB. **826 771**

Desulphurisation of petroleum oils. Esso Research & Engineering Co. **826 693**

Glass fibres. L.O.F. Glass Fibers Co. **826 696**

Water cooling towers. Cooling Towers Ltd., and Rotbart, P. **826 778**

Spray-weld alloys of the boron-silicon-nickel type. Metallizing Engineering Co. Inc. **826 780**

Mobile apparatus for spreading powdery, granular and analogous matter. Cooper, T. V. **826 781**

Mixed anhydrides and their use as catalysts for the polymerisation of ethylenically unsaturated compounds. Imperial Chemical Industries Ltd. **826 787**

Bicyclic guanidino compounds. Monsanto Canada Ltd. **826 837**

Arylsulphonyl derivatives of bicyclic guanidines. Monsanto Canada Ltd. **826 838**

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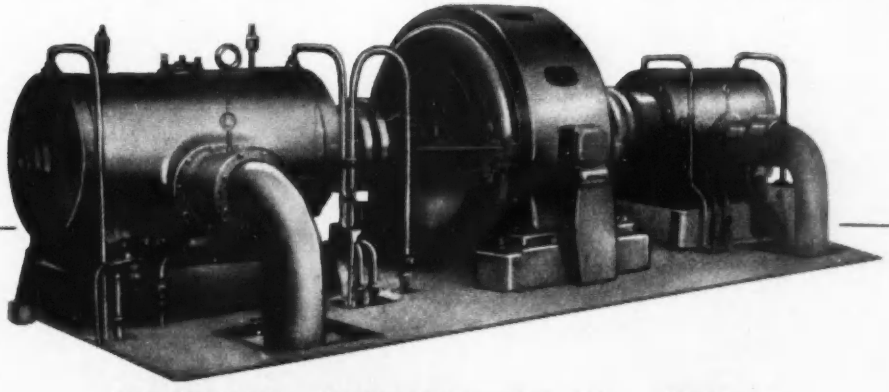
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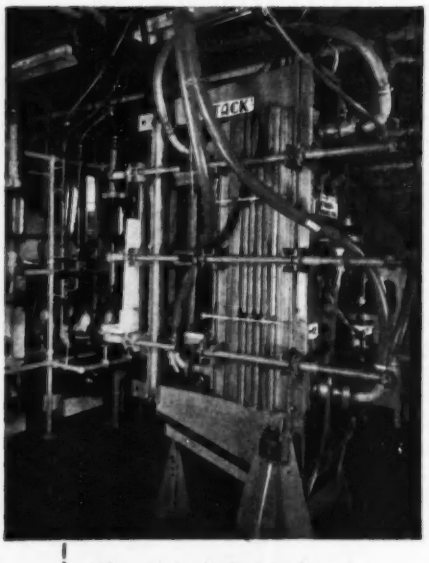
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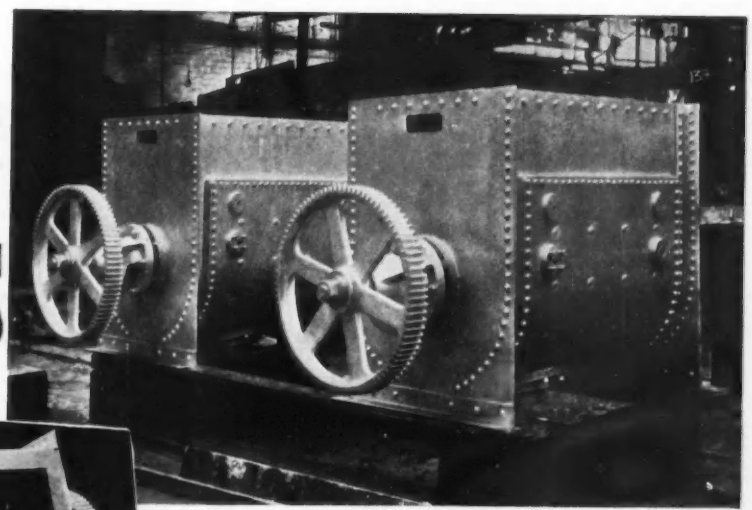
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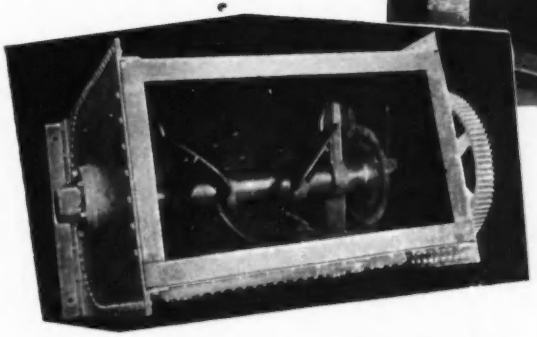
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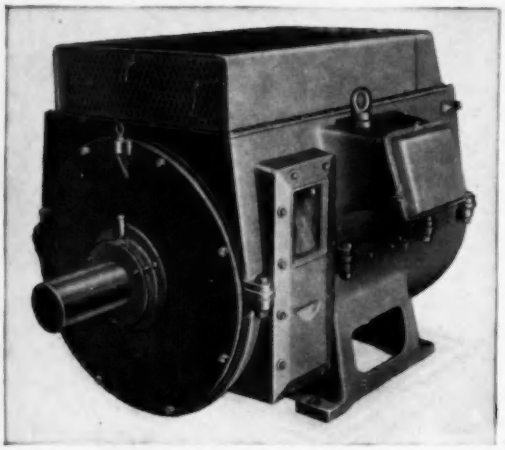
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